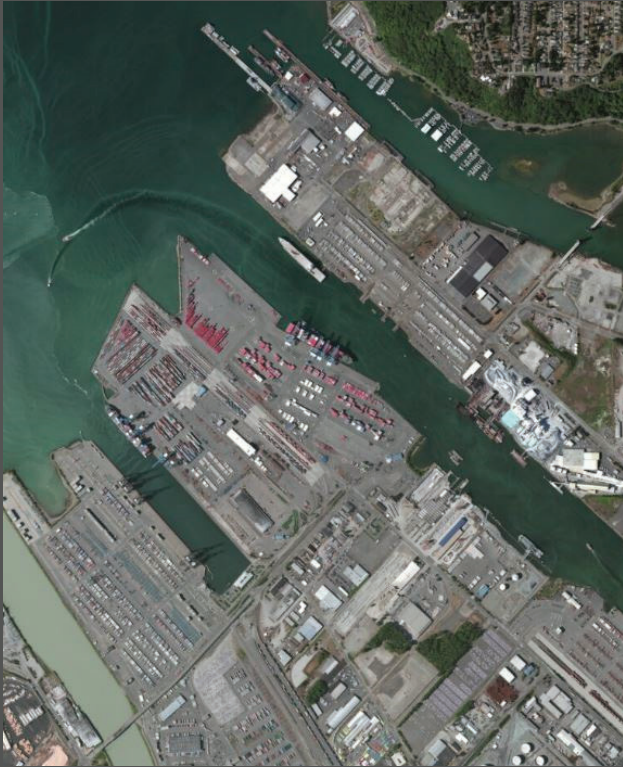


**Pier 4 Phase 1
Removal Action Project**

**Time Critical Removal
Action Completion Report**



Prepared for

Port of Tacoma
P.O. Box 1837
Tacoma, Washington 98401

July 2016

LIMITATIONS

This report has been prepared for the exclusive use of the Port of Tacoma, their authorized agents, and regulatory agencies. It has been prepared following the described methods and information available at the time of the work. No other party should use this report for any purpose other than that originally intended, unless Floyd|Snider agrees in advance to such reliance in writing. The information contained herein should not be utilized for any purpose or project except the one originally intended. Under no circumstances shall this document be altered, updated, or revised without written authorization of Floyd|Snider.

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Executive Summary

The Executive Summary provides a condensed overview of the Time Critical Removal Action Completion Report (TCRACR) that has been prepared on behalf of the Port of Tacoma (the Port) and provides a summary of the removal action activities completed during the Blair Waterway Tributyltin (TBT)/Pier 4 Phase 1 Removal Action Project (Phase 1 Removal Action) to address TBT-contaminated sediments present at Pier 4. The Pier 4 site is located on the west side of the northern portion of the Blair Waterway that lies within the Port's Industrial Development District, adjacent to Commencement Bay in Tacoma, Washington.

The work occurring at Pier 4 has two distinct work phases: (1) the Phase 1 Removal Action, and (2) the Pier 4 Phase 2 Reconfiguration Project, which consists of reconfiguring and reconstructing Pier 4 to be in alignment with Pier 3 within the Husky Terminal. Once the project is completed, Pier 3 and Pier 4 will have a combined marginal pier length of 2,954 feet and will be capable of simultaneously berthing two ultra-large container ships that are approximately 1,300 feet long and 205 feet wide. The reconfigured Pier 4 will be able to accommodate up to eight 100-foot cranes capable of loading ships that are 24 containers wide.

As a result of sediment sampling conducted under the U.S. Army Corps of Engineers Dredged Material Management Program (DMMP) to chemically characterize the proposed project sediments to be dredged for reconfiguration of the pier, approximately 49,000 cubic yards (CY) of TBT-contaminated sediments were encountered at the pier face and under-pier locations. TBT was detected at concentrations greater than the DMMP bulk sediment Bioaccumulation Trigger (BT¹) or screening level (SL) of 73 micrograms per kilogram ($\mu\text{g}/\text{kg}$) that allows for open-water disposal or beneficial use of the material. Approximately 9,000 CY of sediment at the top of slope was determined to be clean as concentrations of TBT were less than the DMMP SL of 73 $\mu\text{g}/\text{kg}$.

In consultation with U.S. Environmental Protection Agency (USEPA) and DMMP representatives, and based on the high TBT concentrations detected at Pier 4, the Port entered into an Administrative Order on Consent (AOC) with USEPA in June 2014, which called for a removal site evaluation, including additional soil, sediment, and ambient site water sampling events. Based on the results of all sampling events, USEPA determined that the cleanup of the TBT-contaminated sediments was to proceed as a Time Critical Removal Action. The Port then entered into a second AOC with USEPA for the implementation of the Phase 1 Removal Action. The Port prepared the Removal Action Work Plan (RAWP) and the USEPA signed an Action Memorandum for the Time-Critical Removal Action at the Blair Waterway TBT Site. The RAWP summarized the work necessary to complete the Time Critical Removal Action, identified best management practices for construction activities, and overviewed the water quality protection monitoring and confirmational and compliance sampling activities that were conducted as part

¹ Previous versions of the DMMP User Manual, which were available during Sampling and Analysis Plan development and the sampling event in April 2013, listed 73 $\mu\text{g}/\text{kg}$ as both the DMMP bulk sediment TBT SL and BT. These versions of the User Manual also listed 0.15 $\mu\text{g}/\text{L}$ as both the DMMP porewater TBT SL and BT; therefore, throughout the project, the DMMP TBT bulk sediment and porewater values of 73 $\mu\text{g}/\text{kg}$ and 0.15 $\mu\text{g}/\text{L}$ have been as SLs, and are also referred to in this plan as SLs.

of the Phase 1 Removal Action activities that are summarized in this report. The RAWP also described the dredge prism, the multi-pass dredge approach, and the post-dredge conformational and perimeter sampling and analysis scheme, which identified 17 dredge management units (DMUs) and 18 perimeter units that would be sampled after dredging.

The RAWP was incorporated into the final bid package that went out to bid in February 2015. Orion Marine Group (Orion) was awarded the contract for the Phase 1 Removal Action on March 16, 2015.

On June 12, 2015, USEPA issued the final 401 Water Quality Requirements Memorandum (401 Memorandum), which documented USEPA's determination that in-water activities associated with the Phase 1 Removal Action met the substantive requirements of Section 401 of the Clean Water Act (USEPA 2015).

The Phase 1 Removal Action was conducted in accordance with the RAWP and the 401 Memorandum. Notice to proceed was issued to Orion by the Port and mobilization was started on April 10, 2015. Pier demolition started on May 1, 2015, and was completed on August 19, 2015. Pile extraction started on June 15, 2015, and was completed on August 19, 2015. All top of slope riprap was removed by August 13, 2015, and dredging of the clean top of slope sediment began on August 24, 2015. Approximately 6,650 CY of clean top of slope sediment was disposed of at the Washington State Department of Natural Resources in-water disposal site from August 24, 2015, to September 14, 2015.

In order to improve slope stability during Phase 1 construction and dredging, slope stabilization measures were implemented between September 22 and November 9, 2015, which consisted of leaving 33 concrete piles in front of the electrical substation and placing concrete remnant piling on the slope. The slope was then covered with geotextile fabric and sand bags. The piles and other material will be removed during Phase 2 construction.

Contaminated sediment dredging started on September 15, 2015. Water quality monitoring was conducted per the Water Quality Monitoring and Protection Plan of the RAWP and the 401 Memorandum. The Transload Site at APM Terminals started receiving dredged material for dewatering and disposal on September 16, 2015, and dredge return water treatment and discharge began on September 21, 2015. Water quality sampling of dredge return water was conducted per the RAWP and 401 Memorandum, with results compared to the USEPA TBT acute and chronic marine aquatic life water quality criteria. One slight exceedance of the chronic criterion was detected in a sample collected from the dredge treatment return water system end-of-pipe discharge. The treatment system carbon filter was backflushed and there were no additional detections of TBT after backflushing.

Orion completed the initial dredging in accordance with the bid plans and specifications and the RAWP on December 30, 2015. Upon completion of dredging, eTRAC Inc. conducted the post-dredge hydrographic survey to confirm that sediment had been removed to the elevations specified in the RAWP. The post-dredge survey found a few high spots; however, progress surveys completed during dredging indicated that the slope and toe of the slope had been dredged to

the required elevations and that the high spots were the result of upper portions of the slope sloughing downslope. Post-dredge confirmational sampling was conducted on January 4 and 5, 2016. Results indicated that additional dredging was necessary in some of the DMUs in order to removed sediment that exceeded the DMMP TBT bulk and porewater SLs. Two more sampling events were conducted and additional dredging was completed in both the DMUs and the perimeter areas. In coordination with USEPA and the DMMP, review of the results of the final sampling event, along with subsurface results from the previous sampling event conducted during additional dredging, indicated that a final dredge pass was needed, but that no additional sampling was required.

In total, approximately 71,000 CY of TBT-contaminated sediment was dredged and sent to the APM Terminals Transload Site, then hauled to Land Recovery Inc. landfill for disposal. Substantial completion and USEPA approval of the completion of the Blair Waterway TBT/Pier 4 Phase 1 Removal Action occurred on February 18, 2016 (Parker 2016a). All Phase 1 Removal Action field activities were completed on March 30, 2016.

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List of Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
401 Memorandum	401 Water Quality Requirements Memorandum
AOC	Administrative Order on Consent
ARAR	Applicable or relevant and appropriate requirement
ARI	Analytical Resources, Inc.
bml	Below mudline
BMP	Best management practice
BT	Bioaccumulation Trigger
cm	Centimeters
CY	Cubic yards
DMMP	Dredged Material Management Program
DMU	Dredge management unit
DRET	Dredge elutriate test
KPFF	KPFF Consulting Engineers

Acronym/ Abbreviation	Definition
LCS	Laboratory control sample
LCS D	Laboratory control sample duplicate
LRI	Land Recovery Inc.
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
MLLW	Mean lower low water
MS	Matrix spike
MSD	Matrix spike duplicate
Orion	Orion Marine Group
OSC	On-Scene Coordinator
PCB	Polychlorinated biphenyl
Phase 1 Removal Action	Pier 4 Phase 1 Removal Action Project
Phase 1 SDM	Phase 1 clean sediment suitability determination
Port	Port of Tacoma
QA	Quality assurance
QC	Quality control
RAWP	Removal Action Work Plan
Rhine	Rhine Demolition, LLC
RSER	Removal Action Project Removal Site Evaluation Report
SL	Screening level
TBT	Tributyltin
TCRACR	Time Critical Removal Action Completion Report
TESC	Temporary Erosion and Sediment Controls
TOC	Total organic carbon
USEPA	U.S. Environmental Protection Agency
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
WQMPP	Water Quality Monitoring and Protection Plan

1.0 Introduction

This Time Critical Removal Action Completion Report (TCRACR) has been prepared on behalf of the Port of Tacoma (the Port) and provides a summary of the removal action activities completed during the Blair Waterway TBT/Pier 4 Phase 1 Removal Action Project (Phase 1 Removal Action) to address tributyltin (TBT)-contaminated sediments present at Pier 4. The Pier 4 site is located on the west side of the northern portion of the Blair Waterway within the Port's Industrial Development District, adjacent to Commencement Bay in Tacoma, Washington (Figure 1.1).

In 2017, the Port will be reconfiguring Pier 4 to be in alignment with Pier 3 within the Husky Container Terminal (Figure 1.2). The final pier will be capable of berthing two ultra-large container ships. In support of the environmental permitting and design processes, Floyd|Snider, on behalf of the Port, conducted multiple soil and sediment sampling events in 2013 under the Dredged Material Management Program (DMMP) for the characterization of the project cutback material for open water disposal or beneficial habitat reuse. The results of the characterization events identified TBT-contaminated sediments underneath and at the face of Pier 4. Historically, TBT was an ingredient in antifouling paint used to coat vessels and marine structures to prevent marine organisms from attaching to the paint surface. TBT is associated with a number of adverse health effects on marine life including reduction in population of benthic invertebrates and masculinization of female marine snails. In humans, TBT compounds are moderately toxic via both ingestion and dermal absorptions exposure.

In consultation with the U.S. Environmental Protection Agency (USEPA) and the DMMP representatives, and based on the TBT concentrations detected at Pier 4, the Port entered into an Administrative Order on Consent (AOC) with USEPA in June 2014. The AOC called for a removal site evaluation, which was conducted in July 2014. The results of the removal site evaluation, as well as a recommended removal action, are summarized in the *Pier 4 Phase 1 Removal Action Project Removal Site Evaluation Report* (RSER; Floyd|Snider 2014a).

The Port entered into a second AOC with USEPA on February 6, 2015, for the implementation of the Phase 1 Removal Action and prepared the Removal Action Work Plan (RAWP). USEPA signed the Action Memorandum for the Time-Critical Removal Action at the Blair Waterway TBT Site (the Action Memorandum) on January 27, 2015. The RAWP summarized the work necessary to complete the Time Critical Removal Action identified in the RSER and identifies best management practices (BMPs) for construction activities, and overviews the water quality protection monitoring and confirmational and compliance sampling activities that were conducted as part of the Phase 1 Removal Action activities summarized in this report.

The RAWP was incorporated into the final bid package that went out to bid in February 2015. Orion Marine Group (Orion) was awarded the contract on March 16, 2015, and notice to proceed was given and construction began on April 10, 2015.

2.0 Site Description

2.1 SITE LOCATION AND OWNERSHIP

The project site is located on Port of Tacoma property, at 1101 Port of Tacoma Road, in the SW & SE quarters of Section 27 in Township 21N, Range 3E Willamette Meridian in the City of Tacoma, Pierce County, Washington State. As shown on Figure 1.2, Pier 4 is located next to Pier 3 on the Blair Waterway in Tacoma, Washington. Pier 3, Pier 4, and their respective backlands, are active terminals that are currently operated by Husky Terminal and Stevedoring, Inc. for offloading shipping containers to trucks and railcars for transport. The Pier 4 project area is zoned for port maritime and industrial use. It is bordered to the south by Concrete Technology Corporation, and Washington United Terminal, and is across the waterway from Totem Ocean Trailer Express.

To the south is the Rhone-Poulenc habitat site built by the Port and managed jointly between the Port and the City of Tacoma. The site serves as a refuge for young salmon before they enter Puget Sound. Northwest of the project site is the Port's Slip 5 Mitigation site. This is a shallow water site maintained by the Port for its habitat value.

For the Phase 1 Removal Action, the Pier 4 site also included a portion of APM Terminals, which is located on the west side of the Sitcum Waterway (Figure 2.1). The two terminals are contiguous and the APM Terminals property is also owned by the Port. During Phase 1, approximately 3.5 acres of APM Terminals' facility was used as the Transload Site to process, dewater, and stockpile the contaminated dredged material for upland landfill disposal. APM Terminals was chosen as the preferred transload site (the Transload Site) because, in addition to having the necessary criteria for a suitable transload and dewatering site, it also met the two criteria that are required by the Comprehensive Environmental Response, Compensation and Liability Act to consider it part of the Phase 1 Removal Action site: (1) it is Port-owned, and (2) it is contiguous with the Phase 1 Removal Action site footprint.

2.2 SITE PHYSICAL CHARACTERISTICS

The Pier 4 site consists of an uplands portion, the former Port Slip 3 that was backfilled behind a bulkhead, and an engineered slope waterward of the bulkhead. The active vessel berthing area adjacent to the pier has an average water depth of 45 to 63 feet, with tidal fluctuations of up to 14 feet. The slope adjacent to the shore of the Blair Waterway decreases from 0 feet to -51 feet mean lower low water (MLLW). The elevation of the upland portion of the shoreline in the project area is approximately +17 feet MLLW and is flat. The adjacent asphalt paved uplands areas are used for container storage and truck travel lanes.

The pier supports four 64-foot-gage container cranes; these are shared with neighboring Pier 3 via a connecting pile-supported trackway. There is a two-story marine operations building, and five high mast light poles, an electrical substation, and associated utilities (refer to Figure 2.2).

2.3 SITE HISTORY AND OPERATIONS

The Blair Waterway is located within the Port's Industrial Development District adjacent to Commencement Bay in Tacoma, Washington. The project area was originally part of the Puyallup River delta, which spread northwest into Commencement Bay. Prior to filling and construction of the current Port, the area within the shoreline cutback was tidal flats with an approximate elevation of +10 feet MLLW (Hart Crowser 1975). The waterway (originally called the Wapato Waterway) was constructed from Commencement Bay to East 11th Street by local interests in the 1920s, 1930s, and 1940s by the dredging of intertidal and shallow subtidal lands and filling adjacent lands to construct uplands.

The area within the shoreline cutback has also been used for commercial and industrial purposes prior to the development as part of the Husky Terminal. Filling has also occurred in several locations as a result of the termination of specific site use activities. Fill material in the project area ranges from approximately 4 to 25 feet deep. The fill soils generally consist of silty sands and sandy silts.

Pier 4 was constructed over a period of years starting in 1967 and ending in 1989. In 1967, the original wharf was constructed from pile Bents 35 through 76 at the south end of the pier, as shown in Photograph 1. In 1981, the pier was expanded from Bent 35 through 20 in the Pier 4 Extension Project, and Bents 1 through 20 were later added in 1989 as part of the Terminal 3 and 4 Wharf Construction Project (Cardno TEC et al. 2012).



Photograph 1. Aerial view of Husky Terminal and dates of construction (Cardno TEC et al. 2012)

2.4 HISTORICAL SOURCES OF TRIBUTYLTIN

The source of TBT is most likely associated with shipbuilding, ship repair, and marina facilities associated with the former Port Slip 3. Contamination has been identified within the portion of the original 1967 wharf and not the 1981 extension area. It is believed that either a release of TBT-containing material or product occurred prior to construction, or sediments containing TBT were placed over the native sediments on the under-pier slope and covered with riprap armor. No indications of TBT-related contamination or paint chips were observed during the pier face or

under-pier sample collection events. Sediments at the top of the slope were not found to be contaminated with TBT.

Contaminated sediment underneath this portion of Pier 4 was likely transported downslope to the pier face during the most recent maintenance dredging of the Pier 4 berthing area, which was completed in 2012. During this event, the contractor dredged accumulated sediments in the berthing area to a final target depth of -51 feet MLLW. Accumulated sediments on the lower portion of the armored slope, underneath the pier, were also pulled waterward from the slope into the dredge prism to minimize post-maintenance dredging sloughing. The rock keyway, an approximately 10-foot-wide by 5-foot-deep section of riprap located at the toe of the slope, was not dredged extensively during this event in an effort to preserve slope stability. The 2013 sediment grab and core sample locations, directly in front of the pier, were likely within the keyway and the refusal encountered during sampling was due to both the riprap in the keyway and potential movement of the slope armoring associated with the 2012 dredge event. It is most likely that residual historical sediment from this area and additional sloughing of sediments contaminated by former shipbuilding, ship repair and marina operations located within the lower portion of the under-pier slopes, are the source of the elevated sediment TBT concentrations at the pier face.

2.5 EXTENT OF TRIBUTYL TIN

The RSER delineated TBT sediment contamination at concentrations greater than the DMMP bulk sediment Bioaccumulation Trigger (BT) of 73 micrograms per kilogram ($\mu\text{g}/\text{kg}$)² in fill units overlying native sediments and delineated TBT hot spots within the zone of contaminated fill. Although the 2014 DMMP User's Manual specified porewater analysis as the preferred measurement of assessing TBT toxicity (USACE 2014), bulk sediment TBT concentrations were measured during these sampling events because the bulk method has a substantially longer holding time than the porewater TBT method and allows for tiered analysis to occur within required holding times. Additionally, the silty sandy sediment may present challenges in the recovery of the necessary volume of porewater for porewater analysis.

The zone of contaminated fill extends from the southern end of the pier, approximately 800 feet to the northwest along the pier face. The zone of contamination along the pier face is generally less than 10 feet thick, except in the south-central portion of the pier where TBT-contaminated fill is present up to 11 feet below mudline (bml). Under the pier, TBT contamination is present from below (i.e., down slope of) elevation -2 feet MLLW down to the toe of the slope at the pier face. The thickness of TBT-contaminated sediments at the toe of the slope at the pier face is up

² Previous versions of the DMMP User Manual, which were available during Sampling and Analysis Plan development and the sampling event in April 2013, listed 73 $\mu\text{g}/\text{kg}$ as both the DMMP bulk sediment TBT screening level (SL) and BT. These versions of the User Manual also listed 0.15 $\mu\text{g}/\text{L}$ as both the DMMP porewater TBT SL and BT. Therefore, throughout the project, the DMMP TBT bulk sediment and porewater value of 73 $\mu\text{g}/\text{kg}$ and 0.15 $\mu\text{g}/\text{L}$ has been, and is in this plan, referred to as a SL. DMMP guidance notes that measurement of TBT in interstitial water may provide a more direct measure of potential bioavailability, and hence toxicity, than bulk sediment concentrations. Bulk values were established to "screen out" areas with negligible risks.

to approximately 11 feet and thins to less than 3 feet thick on the under-pier slope at the shoreward edge of the contaminated zone.

2.6 SUMMARY OF DESIGN DREDGE DEPTHS

In the RAWP, the design dredge depths were conservatively designed to extend into clean material to ensure the complete removal of TBT-contaminated sediments and to minimize dredge residuals as described below:

- **Under-Pier Slope Dredge Areas.** For the under-pier areas, the bottom of the shallowest “clean” (i.e., the TBT concentration did not exceed the TBT screening level (SL) of 73 µg/kg) 2-foot sampling interval was established as the bottom of the dredge prism.
- **Pier Face “Central Hot Spot.”** During preparation of the RAWP, a dredge residual evaluation was conducted that included a multi-pass dredge approach to manage and minimize dredge residuals. As a result of this evaluation, the dredge prism depth of the central hot spot area extends to -57 feet MLLW, which is at least 2 feet into native material where the deepest TBT contamination at Pier 4 was encountered at approximately -54.8 feet MLLW.
- **Pier Face “Southern Hot Spot.”** The dredge prism depth of the southern hot spot area extends to -54 feet MLLW, which is over 5 feet into native material in some areas of the southern hot spot.

This conservative design dredge depth approach resulted in the dredge depth along the pier face ranging from -54 feet MLLW at the south end of the pier, to -57 feet MLLW at the central hot spot, and to -55 feet MLLW at the remaining portions of the pier face. Under the slope, the design dredge depth to remove all TBT-contaminated sediments, includes an 8-foot dredge cut, 9-foot dredge cut, and an 11-foot dredge cut. The design dredge depths are shown on Figure 2.3.

2.7 REGULATORY HISTORY

The Phase 1 Removal Action is the first cleanup at Terminal 4. As part of routine maintenance dredging of the Pier 3 and Pier 4 berths at the Husky Terminal, DMMP characterization was performed in 2011 (Anchor QEA 2011). The project included maintenance dredging to -51 feet MLLW plus a 2-foot overdredge allowance. Sampling was performed on approximately 42,100 cubic yards (CY) represented by four DMMUs. There were no exceedances of SLs for standard DMMP chemicals of concern or TBT.

2.7.1 Pier 4 Phase 1 Agency Coordination and Approvals

As described in Section 1.1, the Port entered into an AOC with USEPA in June 2014 for a removal site evaluation and completion of a RSER to document the findings of the evaluation. On February 6, 2015, the Port entered into a second AOC (AOC #2), which involved preparation of the RAWP and implementation of the removal action.

The Phase 1 Removal Action, including dredged material transloading and dewatering activities, complied with applicable local, state, and federal laws. Together, these regulations and laws were identified as applicable or relevant and appropriate requirements (ARARs) for the Phase 1 Removal Action. No federal, state, or local permits were required for on-site response actions conducted pursuant to the Comprehensive Environmental Response, Compensation and Liability Act Sections 104, 106, 120, 121, or 122 (refer to the Code of Federal Regulations Section 40 300.400(e)(1)). Remedial and Removal Actions conducted under an AOC with USEPA are also exempt from procedural requirements that are required by state and local ARARs, such as permitting and approval requirements; however, they must demonstrate compliance with the substantive requirements of those ARARs. For the Phase 1 Removal Action, this exemption applied to procedural permitting requirements under the Washington State Water Pollution Control Act, the Solid Waste Management Act, the Shoreline Management Act, and local laws requiring permitting, such as City of Tacoma regulations.

In order to solicit feedback and comments for the work and BMPs, a Phase 1 Project Description (Floyd|Snider 2014b) was submitted to tribes and local, state, and federal agencies including the Puyallup Tribe, City of Tacoma, Washington State Department of Ecology, Washington Department of Fish and Wildlife (WDFW), Washington State Department of Natural Resources (WDNR), U.S. Army Corps of Engineers DMMP, United States Coast Guard, and National Oceanic and Atmospheric Administration National Marine Fisheries Service as a formal request for comment on the work to be conducted and BMPs to be implemented. The task-specific BMPs that were implemented incorporated the feedback received from these entities.

On June 12, 2015, USEPA issued a 401 Water Quality Requirements Memorandum (401 Memorandum), which documented USEPA's determination that the planned in-water activities associated with the Phase 1 Removal Action met the substantive requirements of the Clean Water Act §401 (USEPA 2015).

3.0 Chronological Summary of Removal Action

The Phase 1 Removal Action was conducted in accordance with the RAWP and the 401 Memorandum. An overall summary of the removal action activities is depicted in Table 3.1, including dates of each activity. Work included a number of construction activities, as described in further detail in Section 5.0. Orion started mobilization to the Site on April 10, 2015. Pier demolition started on May 1, 2015, and was completed on August 19, 2015. Pile extraction started on June 15, 2015, and was completed on August 19, 2015. All top-of-slope riprap was removed by August 13, 2015, and dredging of the clean top of slope sediment began on August 24, 2015. Approximately 6,650 CY of clean top-of-slope sediment was disposed of at the WDNR in-water disposal site from August 24, 2015, to September 14, 2015.

In order to improve slope stability during Phase 1 construction and dredging, slope stabilization measures were implemented between September 22 and November 9, 2015, consisting of leaving 33 concrete piles in front of the electrical substation and placing concrete remnant piling on the slope. The slope was then covered with geotextile fabric and sand bags. The piles and other material will be removed during Phase 2 construction.

Dredging of contaminated sediment started on September 15, 2015. Water quality monitoring was conducted in accordance with the Water Quality Monitoring and Protection Plan (WQMPP)—an appendix to the RAWP—and the 401 Memorandum. The Transload Site at APM Terminals started receiving dredged material on September 16, 2015, and dredge return water treatment and discharge began on September 21, 2015. Water quality sampling was conducted per the RAWP and 401 Memorandum and there was only one slight exceedance of the chronic criterion in a sample collected from the dredge treatment return water system end-of-pipe discharge. The treatment system carbon filter was backflushed and there were no more detections of TBT.

Orion completed the initial dredging, per the bid plans and specifications and the RAWP, on December 30, 2015. Upon completion of dredging, eTRAC Inc. conducted the post-dredge hydrographic survey to confirm that sediment had been removed to the elevations specified in the RAWP. The post-dredge survey found a few high spots; however, progress surveys completed during dredging indicated that the slope and toe of the slope had been dredged to the required elevations and that the high spots were the result of upper portions of the slope sloughing downslope. Post-dredge confirmational sampling was conducted on January 4 and 5, 2016. Results indicated that additional dredging needed to be conducted in some of the dredge management units (DMUs) in order to remove sediment that exceeded the TBT bulk SL (and porewater SL, as described in Section 7.0). Two more sampling events were conducted and additional dredging occurred in both the DMUs and the perimeter units. The results of the final event, along with subsurface results from the second event, indicated that a final dredge pass should be conducted and no additional sampling was required.

In total, approximately 71,000 CY of TBT-contaminated sediment was dredged and sent to the APM Terminals Transload Site and then to Land Recovery Inc. (LRI) for disposal. Substantial completion and USEPA approval of the completion of the Phase 1 Removal Action occurred on February 18, 2016 (Parker 2016a). All Phase 1 removal action field activities were completed on March 30, 2016.

4.0 Project Organization, Costs, and Schedule

4.1 KEY ORGANIZATIONS AND ROLES

- **USEPA On-Scene Coordinator (OSC).** The removal action was coordinated under the authority of the OSC, Kathy Parker.
- **USEPA Water Quality Specialists.** USEPA's Erika Hoffman and Justine Barton assisted with the development of the Phase 1 Removal Action protection measures and implementation of the removal action, and ensured the removal action was consistent with the USEPA-approved RAWP/WQMPP and 401 Memorandum.
- **Dredged Material Management Program.** The DMMP has been an integral part of the Pier 4 characterization and decision-making process since the site cutback material was initially characterized in 2013 for open water disposal or beneficial habitat reuse. During the removal action, the DMMP reviewed post-dredge confirmational sampling data results as they related to the suitability of the underlying Phase 2 dredge material.
- **Port of Tacoma.** The Port is the current owner of the Site and was responsible for overall removal action implementation, oversight, and contracting.
- **Floyd|Snider.** Floyd|Snider provided technical support during the removal action, processed the removal action analytical data, and prepared figures and tables displaying the data. Floyd|Snider also performed the post-dredge confirmational sampling.
- **KPFF Consulting Engineers (KPFF).** KPFF was the design engineer for the removal action and, with geotechnical support from Hart Crowser and dredge return water treatment support from Aspect Consulting, LLC, worked with the Port to respond to design and post-dredge survey-related questions.
- **Orion Marine Group.** Orion was the marine contractor for the removal action with support from Rhine Demolition, LLC (Rhine) for pier demolition, and Water Tectonics for dredge return water treatment oversight.

4.2 PROJECT COSTS

The following table presents the project design and construction costs, as tracked by the Port engineering project manager.

Item	Cost to Date
Design Stage	
Consultant(s)	\$982,639
Port Staff	\$180,650
Permitting Fees	\$145
Purchase Orders (Pacific Pile and Marine driving deck holes)	\$11,600
USEPA Oversight	\$6,692
Design Stage Total	\$1,181,726
Construction Stage	
Construction Contract	\$12,525,375
Washington State Sales Tax (9.5%)	\$1,191,049
Consultant(s)	\$416,960
Port Staff	\$599,889
Permitting Fees	\$3,198
Testing & Inspection	\$5,346
Purchase Orders	\$0
Miscellaneous (Security off hours, Port Maintenance Staff response, etc.)	\$106,553
APM Rent Relief	\$428,286
Crack Sealing at APM	\$66,070
Relocation of Husky Communications	\$129,206
Construction Stage Total	\$15,471,932

5.0 Removal Activities

This section describes removal activities at the site during the Phase 1 Removal Action. An overall summary of the removal action activities is summarized in Table 3.1, including dates of each activity.

5.1 SITE MOBILIZATION

On April 10, 2015, Orion mobilized to the Site and began site preparation activities, including installation and/or construction of the following:

- **Site Survey.** A pre-dredge hydrographic survey of the dredge prism and surrounding area was conducted between April 13 and May 1, 2015.
- **Haul Access Road.** In mid-April a haul road was set up to separate Husky Terminal traffic from site construction traffic. The haul road was modified from the original design to allow for construction truck turning and to provide a barrier between the construction gate and container truck gates.
- **Utility Locate and Potholing.** A utility locate was conducted between April 17 and 22, 2015, to identify underground utilities so services to the pier could be shut off during construction.
- **Fencing and Temporary Erosion and Sediment Controls (TESC).** Orion secured the site by installing temporary security fencing and concrete traffic barriers around the perimeter of the site between April 17 and 20, 2015. In order to prevent stormwater contamination and water pollution from construction activity, Orion installed TESC in late April, per the Port Stormwater Pollution Prevention Plan. TESC consisted of storm drain and catch basin inlet and outlet protection, and temporary sediment barriers consisting of ecology blocks and straw wattles.
- **Temporary Construction Facilities.** On April 21, 2015, construction field trailers and sanitary facilities were delivered and set up throughout the project site.
- **Floating Debris Boom.** Between April 20 and 27, 2015, Orion set up a temporary floating boom around the perimeter of the dredging area (Appendix A, Photograph 1). The floating boom was anchored to prevent the boom from drifting outside project work area limits. An extra debris boom was placed at the base of the pier as a precautionary measure to contain potential accidental fuel spills. The Port and Orion monitored the boom throughout construction to ensure it did not encroach into the channel and interfere with ship activities.
- **Mobilization of Demolition Equipment.** Between April 22 and 28, 2015, Rhine's demolition equipment was mobilized to the site.

5.2 DEMOLITION OF THE MAJORITY OF THE PIER 4 STRUCTURE

The majority of the demolition work was conducted by Rhine. The first demolition activities consisted of cutting, capping, and freeing fenders from the dock face. To minimize the potential for adverse water quality impacts, all over-water and near-water demolition was conducted following BMPs described in Section 5.2.1 of the RAWP and the 401 Memorandum.

Deck asphalt removal began on May 1, 2015. On May 11, 2015, Rhine began demolition of the bull rail, pier deck panels, and pile caps, starting from the north and working to the south (Appendix A, Photograph 2). All material was stockpiled on the pier for eventual off-site disposal or recycling (Appendix A, Photograph 3). Ballast removal also started on May 11, 2015. During removal of ballast, Rhine observed oil staining within the excavated material from the southern portion of the pier (Appendix A, Photograph 4). The Port tested the material to determine the appropriate disposal requirements. Results indicated that oil-range TPH were present (refer to Appendix B). The Port and Orion determined that additional samples should be taken because the initial sample was taken from surface material and the discoloration increased with depth during excavation. The second set of analytical results indicated that a portion of the material contained oil-range TPH. The Port directed Orion to dispose of the contaminated material, and 1,979 tons of ballast were taken to LRI. The Port also tested the ballast from the northern portion of the pier. The analytical results indicated that this ballast did not contain TPH.

During deck demolition, Orion noted pre-existing damage to some pilings. During removal of the deck panels, some piles became separated from the pile caps and fell into the waterway. Orion conducted a diver survey and no broken piles were observed above the sediment line. Per Orion's Demolition Plan, in order to prevent deck debris from falling into the waterway, Orion made debris catching floats out of wood that were placed under active removal areas and moved according to where demolition was occurring (Appendix A, Photograph 5). The floats were emptied as necessary to prevent overloading or spillage of debris into the water. In order to allow access to under pier areas for saw cutting and chipping, a combination of floats and friction collar-supported access platforms were used. Any material on the floats was maintained so that debris was never submerged during a rising tide.

While cutting and capping water utilities under the pier, a water leak occurred. Port plumbers worked with Orion to create a plan of action to isolate leaking water at the bulkhead. The Port cut and capped the bull rail water line on April 29, 2015. On June 25, 2015, the Port turned off water to the pier so Orion could pothole the area to determine the cause of the leak. During potholing, Orion was able to isolate and repair the leak.

5.3 VIBRATORY PILE EXTRACTION

Per the RAWP, pile extraction was approved to begin on June 15, 2016, 1 month prior to the start of the WDFW allowed in-water work window for Commencement Bay. Vibratory extraction of concrete, timber, and steel piles commenced on June 15, 2015. To minimize the potential for

adverse water quality impacts, all vibratory pile extraction was conducted following BMPs described in Section 5.4.1 of the RAWP and the 401 Memorandum.

Piles were first extracted using a vibratory hammer (Appendix A, Photographs 6 and 7). Then, the piles were attached to rigging cables attached to the derrick barge and transported to shore where they were placed in a processing area to be broken into smaller pieces for eventual off-site disposal or recycling, depending on the pile type.

Occasionally piles would break during their removal, and Orion would log the location using a boom-tip GPS for later removal. At the end of all demolition and pile extraction, a total of 37 piles, or approximately 3 percent of the total, had broken and required removal. Between August 31 and September 9, 2015 (prior to the beginning contaminated sediment dredging), Orion removed broken piling by using a diver to attach rigging cables to the piles and then pulling the piles to the surface using the derrick barge.

In the hollow interior of the steel pipe piles associated with the pier fender system, sediment was present that plugged the bottom of the pile (Appendix A, Photograph 8). This sediment was assumed to be contaminated and the steel sections containing sediment were cut off, covered, and stockpiled on-site. On August 5, 2015, the steel pipe piles and the associated sediment were transported off-site for landfill disposal.

On August 17, 2015, shoring consisting of a creosoted woodpile wall and lagging were observed on the north side of the electrical substation. In coordination with USEPA, this was left in place, as it is located outside of the Phase 1 dredge prism. A portion of the timber bulkhead will be removed as part of Phase 2 activities. Additional debris and creosoted woodpiles were found throughout the pile extraction work and were removed.

Project pile extraction was completed by August 19, 2015. In order to protect the electrical substation, 33 piles were left in place and will be removed during Phase 2, as described in Section 5.7.

5.4 NAVIGATION LIGHT PILE REMOVAL AND INSTALLATION

The existing navigation light at the south end of Pier 4 was relocated to accommodate demolition of the pier, and, based on communications with the Puget Sound Pilots and U.S. Coast Guard, its companion light located on the other side of the Blair Waterway was also relocated (refer to Figure 2.2). On July 22, 2015, re-location of the north navigation light began, and on July 29, 2015, vibratory removal of the old piles for light tower #4 (the tower on the pier) was completed. For the navigation light across the waterway, the new steel piles were driven on November 4, 2015, and the navigation platform was installed on November 25, 2015. All pile pulling associated with the navigation lights was completed by the end of December 2015.

5.5 DREDGING OF TOP-OF-SLOPE CLEAN MATERIAL

In order to facilitate the dredging of the approximately 9,000 CY of clean sediment at the top of the under-pier slope, starting on July 28, 2015, the 2-foot layer of riprap armor (approximately 2,300 CY) was removed from the slope and was temporarily stockpiled. The clean riprap removal was completed on August 13, 2015. On December 23, 2015, some of the stockpiled riprap was taken off-site to Marine View Drive, a Port aquatic habitat project, for emergency stabilization. As discussed in the RAWP, a small quantity was used for slope stabilization in the vicinity of the electrical substation and the rest was disposed of off-site.

A pre-dredge survey of the slope was conducted between August 12 and 13 and August 17 and 18, 2015. Dredging of the clean top of slope sediment began on August 24, 2015, and lasted through September 1, 2015. To minimize the potential for adverse water quality impacts, all clean sediment dredging was conducted following BMPs described in Section 5.5.1.1 of the RAWP and the DMMP Phase 1 clean sediment suitability determination (Phase 1 SDM; DMMO 2015).

An interim post-dredge survey was conducted on September 1 and 2, 2015, and indicated that additional material needed to be dredged. Orion re-dredged on September 11 and 14, 2015. A second interim post-dredge survey was then conducted on September 14, 2015, and indicated that target elevations were achieved and clean dredging was complete.

5.6 OPEN-WATER DISPOSAL

On July 27, 2015, the Port received the final signed Disposal Site Use Authorization from WDNR approving use of the Commencement Bay non-dispersive open water disposal site for disposal of all clean top-of-slope sediment (WDNR 2015). Between August 24, 2015, and September 14, 2015, approximately 6,550 CY (approximately 72 percent of the design estimated volume) of clean material was transported to the Commencement Bay non-dispersive site (refer to Appendix C for disposal authorization and documentation). All sediment was transported and disposed of according to the BMPs set forth in the Phase 1 SDM, RAWP, and final bid documents.

5.7 SLOPE STABILIZATION

In order to improve slope stability during Phase 1 construction and dredging, slope stabilization measures were implemented. Approximately 33 concrete piles in front of the electrical substation were left in place during Phase 1 construction in order to protect the slope from erosion (Figure 5.1; Appendix A, Photographs 9 through 11). These piles will be extracted during Phase 2 construction.

In addition to leaving the concrete piles in place, additional measures were taken to improve slope stability during dredging. Between September 22, 2015, and November 9, 2015, Orion placed concrete remnant piling on the slope behind the abovementioned 33 piles and placed geotextile fabric and sandbags along the dredged slope from the top of the slope to an elevation of approximately +5 feet MLLW (Appendix A, Photograph 12). In addition to the concrete piles,

this material will be removed and disposed of at an approved upland landfill as part of Phase 2 construction prior to the start of dredging in that area.

5.8 DREDGING OF TRIBUTYLtin-CONTAMINATED MATERIAL

Per the RAWP, the digging bucket was modified with a steel-fabricated “top hat” in order to close off the top of the dredge bowls to minimize sediment loss as the bucket was raised through the water column. The top hat was constructed between September 2 and September 11, 2015. To prepare for contaminated dredging, leak tests were conducted on the barges prior to use and all leaks observed were fixed prior to barge use.

To minimize the potential for adverse water quality impacts, all contaminated dredging was conducted following BMPs described in Section 5.5.1.2 of the RAWP. Per the RAWP, the dredging sequence was conducted from the top of slope down to the toe of the slope for stability considerations and to support the natural angle of repose and minimize sloughing of contaminated sediment downslope. Orion developed a sequencing plan that was included in their USEPA-approved Dredging and Disposal Work Plan (provided in conjunction with this TCRACR to USEPA on a separate disc), which illustrated the north to south dredge sequence they would be utilizing (refer to Figure 5.2). The dredge plan is shown in Figure 2.3.

Per the RAWP, dredging was implemented in a multi-pass dredge approach, in which the majority of the TBT-contaminated sediment was removed in the first pass (vertical cut), which was followed by a second pass that removed a thinner layer (1 to 2 feet) of contaminated sediments plus at least 2 feet of clean underlying sediment down to the dredge design depth. In the hot spot areas, a third pass was conducted as part of the required dredging (initial dredging prior to post-dredge confirmational sampling), for dredge residual management.

5.8.1 Initial Dredging of Non Hot Spot Areas

On September 15, 2015, contaminated dredging started according to the sequencing plan, as shown in Figure 5.2. In general, Orion averaged between 700 to 900 CY of dredged sediment per day. During dredging, the 5-CY dredge bucket top hat was not allowing sufficient water to escape during the filling of the bucket, which slowed the dredging process. After consultation with the Port and USEPA, the environmental bucket was switched to a larger, 7.5-CY bucket and the top hat was modified with vents, which allowed the bucket to contain more sediment by allowing water to escape.

During the initial dredge passes, co-mingled riprap occasionally prevented the bucket from fully closing, which resulted in turbid water and sediment being released upon transfer to the dredge barge (Appendix A, Photograph 13). As dredging progressed, and more riprap was removed, there was minimal rock or debris interference with bucket closure (Appendix A, Photograph 14).

During dredging, piles and other debris were occasionally observed within the dredge prism that could not be extracted with the dredge bucket. As debris was found, Orion logged the location for later removal, as described in Section 5.9.

On October 29, 2015, a plastic drum with unknown contents was found during dredging. The drum was brought to shore and placed in secondary containment, dredging was then temporarily halted, USEPA was notified, and Clean Harbors was contacted to inspect the drum. Clean Harbors collected a sample that was then analyzed by the toxic characteristic leachate procedure (TCLP) for metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), total organochlorine pesticides, polychlorinated biphenyls (PCBs), TBT, and pH and flash point (Appendix B). Although there were low-level detections of TBT and PCBs, the barrel was deemed non-hazardous and was transloaded to LRI for landfill disposal on December 16, 2015.

5.8.2 Initial Dredging of Hot Spot Areas

Per the RAWP, to minimize travel distances of water quality impacts and residuals during dredging of the two hot spot areas, a floating boom-supported turbidity curtain was constructed, providing sediment containment around the immediate vicinity of the dredge bucket. Orion assembled the turbidity curtain between August 26 and September 18 (Appendix A, Photograph 15).

On November 4, 2015, hot spot dredging commenced using the turbidity curtain in the central hot spot (Appendix A, Photographs 16 and 17). Orion continued to dredge both hot spot and non-hot spot locations from north to south according to their dredge sequencing plan (refer to Figure 5.2).

5.8.3 Completion of Initial Dredging

On December 30, 2015, Orion completed the initial dredging to the extents specified in the bid specifications and the RAWP. Upon completion of dredging, eTRAC Inc. conducted a post-dredge survey on December 31, 2015. A memorandum by KPFF that summarized the results of the survey indicated that, although a few high spots were found (the highest within DMU 3), progress surveys completed during dredging indicated that the slope and toe of the slope had been dredged to the required elevations and that remaining high spots were the result of upper portions of the slope sloughing downslope (KPFF 2016). Additionally, a ridge was evident running north to south, just outside of and waterward of the dredge prism. Based on the review of progress surveys and observations by Orion, it was assumed that the accumulated sediment had sloughed from the upper portions of the slope due to tidal action. On a call with USEPA and the DMMP on January 4, 2016, it was determined that post-dredge confirmational sampling could proceed, as described in Section 7.1.

5.8.4 Additional Dredging

The results of the post-dredge confirmational sampling that was conducted on January 4 and 5, 2016, indicated that additional dredging needed to be conducted in order to remove sediment that exceeded the SLs for both porewater and bulk TBT. In the perimeter units, waterward of the Phase 1 dredge prism, there were also bulk and porewater TBT exceedances. Draft validated and tabulated data were submitted to USEPA and the DMMP on January 6, 8, and 11, 2016.

On January 21, 2016, an email documenting the approach for additional dredging and confirmational sampling developed with the agencies over multiple conference calls and emails was sent to the agencies (Massingale 2016). The sampling approach is discussed in Section 7.2. The following bullets summarize the dredging approach that was developed and the additional dredge plan is shown on Figure 5.3:

- Re-dredging from the top to the bottom of the slope in DMUs 3, 4, 6, 7, and 8 to a minimum of 1 foot below the dredge design elevations, or re-dredging a minimum of 1 foot if existing areas within the DMU are already below the dredge design elevation. The mound located in DMU 3 will be removed.
- Following completion of dredging in DMUs 3, 4, 6, 7, and 8, dredging of the grids represented by perimeter sample locations PR-15, PR-16, PR-17, PR-18, PR-19, PR-26, and PR-21 (first row) and PR-9, PR-10, PR-11, PR-12, and PR-13 (second row) to a minimum of 1 foot below the pre-dredge elevations. This includes the removal of the ridge identified in a post-dredge survey. In grids PR-14 and PR-20 the ridge will be removed, but additional dredging of 1 foot below the pre-dredge elevations will not be required.
- Following completion of the dredging of the PR- grids listed above, dredging of the outer and southern boundary grids represented by PR- sample locations PR-4, PR-5, PR-6, PR-7, PR-8, PR-22, and PR-23 to minimum of 1 foot below the pre-dredge elevations. Additional sampling of the perimeter grids will not be necessary.
- Dredging of the grids represented by and extending out to PR-22 and PR-23 to a minimum of 1 foot below the pre-dredge elevations.

The additional dredging proceeded according to the approach described above and once re-dredging of DMUs 3, 4, 6, 7, and 8 was completed on January 20, 2016, and dredging had started in the perimeter units, a second sampling event consisting of sediment coring was conducted on January 29 and 30, 2016, as described in Section 7.2. A final sampling event was conducted on February 9, 2015, as described in Section 7.3. The results of the second and final post-dredge confirmational sampling indicated that another pass was needed in DMUs 3, 4, 6, 7, and 8 to remove sediment that exceeded the SLs for both porewater and bulk TBT.

Because the last pass of dredging was not completed by February 15, 2016, the OSC directed the Port and Orion to continue dredging and notified the natural resource agencies that re-dredging would continue a few days into the fish window (Parker 2016b). The final dredge pass was conducted between February 15 and 18, 2016. A final post-dredge survey was completed on February 22, 2016.

5.8.5 Final Dredge Extents

Figure 5.4 presents a comparison of the pre-construction surveyed surface to the post-construction surveyed surface. The difference in elevations between the pre-construction surveyed surface and the post-construction surveyed surface is shown by color. For example, the

area shown in pink had between 10 and 22.5 feet of sediment removed. In the perimeter units, in general, between 0.5 and 4 feet were removed with a few areas in PR-4, PR-5, PR-9, and PR-10 showing 6 inches of possible accumulation. Variations of this amount are expected in comparisons of bathymetric surveys and the respective allowable accuracies of the survey equipment. Figures 5.5 through 5.7 show representative cross sections. Figure 5.5, Section 1+00, at the north end of the dredge prism, shows approximately 10 feet was removed at the toe of the slope. Moving waterward, the removal of sediment in the perimeter units is evident by the comparison between the red pre-construction survey and the green post-construction survey line. Figure 5.6, Section 3+00, which extends through DMUs 3 and 4, shows the pre-construction surface in red and the final post-construction surface in green, which is representative of the completion of all initial and additional dredging (conducted on February 22, 2016). The survey that was completed on December 31, 2015, after initial dredging was complete, is also shown, in pink. This line, which is labeled “interim construction survey” shows that design elevations were met after initial dredging; however, material from the upper slope sloughed down to the toe-of-slope, bringing the surface there up to the pre-construction survey elevation in some places, as shown by the green line. Finally, Figure 5.7, Section 9+50, located at the southern end of the dredge prism through the southern hot spot, shows that sediment was removed from the top of slope down to the toe and waterward out into the perimeter units.

5.9 DEBRIS REMOVAL ON THE SLOPE AFTER INITIAL DREDGING

As discussed in Section 5.8.1, during dredging, broken piles and other debris were observed by Orion. These were logged with a boom-tip GPS by Orion for later removal. Upon the completion of the dredging to the extents specified in the bid specifications and the RAWP, a diver survey was conducted to inspect the slope and confirm the locations of debris. In consultation with USEPA, 21 concrete piles and 1 timber pile were removed via vibratory hammer or cut off at the mudline between January 11 and 14, 2016, after the first round of confirmational sampling had been completed in the DMUs where debris was present. No jetting or digging around the piles was allowed during removal.

5.10 TRANSLOADING

5.10.1 Mobilization and Preparation

On August 5, 2015, Orion mobilized to APM Terminals and began site preparation activities, including installation and/or construction of the following (refer to Figure 5.8 for the Transload Site Configuration):

- **New Haul Routes.** APM Terminals designed a new route through the terminal to maximize safety, with ingress and egress off of two locations on Lincoln Avenue.
- **Crack and Catch Basin Sealing.** Per the RAWP, although APM Terminals is fully paved with asphalt 4 inches thick, any significant cracks needed to be sealed prior to starting the transload and dewatering activities and existing 4-inch deck drains needed to be plugged to prevent all process water and sediment from entering the Sitcum

Waterway during transload activities. From August 5 to 7, 2015, Puget Paving sealed cracks over approximately 3.75 acres of APM Terminals (Appendix A, Photograph 18).

- **Fender Protection Piling.** On August 24 and 25, 2015, the ten 20-inch steel pin piles from the fender system at Pier 4 were installed as temporary fender protection piling at APM Terminals to protect the existing fender system (Appendix A, Photograph 19).
- **Fence and Settling Pond Setup.** Between August 18 and September 8, 2015, Orion set up the perimeter fence and settling pond, which was constructed of ecology blocks and lined with a sand bedding and impermeable liner (Appendix A, Photograph 20).
- **Installation of Yard Pumping System and TESC.** In order to capture stormwater from APM Terminals during transloading activities, between September 1 and 10, 2015, Orion installed sumps, pumps, and yard piping throughout the terminal. Per the Port Stormwater Pollution Prevention Plan, between September 2 and 10, 2015, Orion installed TESC, which consisted of sealing existing storm catch basins and deck drains.
- **Temporary Power.** Between August 23 and September 9, 2015, Orion installed temporary power to APM Terminal to facilitate the water treatment system.
- **Delivery of Material Handler and Apron Set-Up.** To prevent sediment from going into the water, a spill apron consisting of mud mats and filter fabric was placed between the barge and the dock (Appendix A, Photograph 21). Material was offloaded from the barge by a material handler with a clamshell bucket. Excess water within the barge cells was pumped into the settling ponds for water treatment.
- **Water Treatment System Setup.** On August 31, 2015, Water Tectonics mobilized to APM Terminals to set up the water treatment system, which was configured as shown in Figure 5.9 (Appendix A, Photographs 22 and 23).
- **Wheel Wash.** In order to ensure that the dredged contaminated sediment was not tracked off-site, a wheel wash was constructed at the end of the truck route between August 31 and September 3, 2015. The water collected in the wheel wash reservoir was re-circulated. When the water became visibly turbid or “dirty,” it was pumped to the settling pond for treatment in the treatment system and the wheel wash was then re-filled with clean water.

5.10.2 Transload Operations

The Transload Site started receiving dredged material on September 16, 2015. TBT-contaminated dredged material was transported by water-tight scows and transferred to shore for processing (refer to Figure 2.1 for transload route; Appendix A, Photographs 24 and 25). On each barge there was a pump that would pump the free water of the dredged material into separate holding cells on the material barge. Once the barge was full, it was towed to the Transload Site. Once the barge was docked, the sediment was transferred with the material handler over the apron and into the lined trucks. Per the *Transload, Transport, and Disposal Work Plan* (Orion 2015), hog fuel (i.e., wood chips) were available for use as a drying agent when the sediment was too wet for

transport to LRI. Daily records were taken with the number of barge trips and amount of material offloaded and disposed of. The number of truck trips was recorded and weight tickets were retained. All truck tickets were provided in conjunction with this TCRACR to USEPA on a separate disc.

To minimize the potential for adverse water quality impacts, all transloading was conducted following BMPs described in Section 5.6 of the RAWP and as detailed in Orion's USEPA-approved Transload, Transport, and Disposal Work Plan (provided in conjunction with this TCRACR to USEPA on a separate disc). Transloading operations continued throughout dredging and the last transloading of contaminated sediment occurred on February 26, 2016.

5.11 DEWATERING TREATMENT SYSTEM AND DREDGE RETURN WATER

The dewatering treatment system was designed in accordance with the RAWP and bid specifications and was managed by Water Tectonics to treat both the dredged water and surface/stormwater collected from the Transload Site. The removal of particulate bound and dissolved TBT from the water included primary screening and settling in the treatment pond to remove large particles; electro-coagulation and settling; mixed-media filtration to remove total suspended solids, turbidity, and adsorbed TBT; and, finally, granulated activated carbon as the final polishing step to remove dissolved TBT.

The first day of dredge return water treatment and discharge was September 21, 2015. While the material handler was offloading the dredged sediment, a pump was used to transfer the water out of the barge holding cells, through PVC piping and into the settling pond, where it was allowed to settle before treatment (Appendix A, Photograph 26). Throughout dredging and transloading, the pond was continuously filled and emptied. As sediment accumulated, it was shoveled out and disposed of with the dredged material. The plastic liner over the sand bedding was difficult to maintain and required Orion to be very careful so as not to puncture the liner. Water was processed in batches when the pond was full enough, such that discharge occurred approximately every 3 to 5 days.

As described in the RAWP, during hot spot dredging, dredge return water was not allowed to be discharged until receipt of chemical analytical results confirmed that the TBT concentration in the end-of-pipe water quality sample collected on Day 1 was less than the TBT acute water quality criterion. Prior to receipt of the Day 1 TBT results, the dredge return water treatment system did not discharge any water. Based on the dredging sequence, the dredge return water that was sampled as being representative of the first day of hot spot dredging was from Zone 5 (Figure 5.2), which consisted of sediment from the first pass of the central hot spot. Prior to placing the Zone 5 sediment and associated water in the settling pond, Orion removed all of the non-hot spot sediment so the Day 1 hot spot water sample was representative of water from the hot spot with the greatest detected TBT sediment concentrations from within the Phase 1 dredge prism.

The last day of dredge return water discharge was on February 22, 2015. In total, approximately 4.7 million gallons were treated and discharged during the Phase 1 Removal Action.

5.12 CONTAMINATED SEDIMENT DISPOSAL

Off-site disposal of TBT-contaminated sediment began on September 16, 2015. USEPA requested that all trucks be covered before leaving APM Terminals. All soil hauled off-site for disposal was transported by truck to LRI in Graham, Washington, under the Waste Disposal Authorization No. 1843 through 1843c (Appendix B). The initial waste disposal authorization was for 80,000 tons but was extended three times due to the increase in dredged sediment.

In total, approximately 109,440 tons of contaminated sediment were hauled off-site for disposal between September 16, 2015, and February 26, 2016.

5.13 CONCRETE TEST PILE PROGRAM

To facilitate the reconstruction of Pier 4 as part of Phase 2, the Port performed a concrete test pile program as part of the Phase 1 Removal Action. The intent of the concrete test pile program was to confirm design assumptions made about installation and structural capacity of the concrete piles that will be installed to support the proposed reconfigured pier in Phase 2. Per the RAWP, test pile installation could occur concurrent with dredging; however, piles were to be installed and removed only in areas where contaminated sediments had been completely removed and confirmational sampling had been completed.

Due to a delay in the dredging schedule, equipment availability, and concern about in-water work extending into the WDFW fish window, Orion proposed installation of the test piles after the target dredge elevations had been reached but prior to confirmational sampling. The Port and USEPA approved Orion's proposal since two of the test pile locations were outside of the Phase 1 dredge prism and the remaining two pile locations within the dredge prism were more than 35 feet away from the hot spot areas. To ensure the test piles were not driven down through potentially contaminated sediment, prior to pile installation on December 2, 2015, Orion dredged a localized area of sediment from around each test pile location inside the dredge prism.

The concrete test piles were installed between December 7 and 10, 2015, at the locations shown on Figure 5.10). After installation, they were monitored and data were collected. The test piles were removed on December 14 and 15, 2015.

5.14 DEMOBILIZATION OF PIER 4 SITE AND TRANSLOAD SITE

Following completion of the removal action, demobilization consisted of decontaminating the barges, dismantling and removing the turbidity curtain, and removing all office and construction trailers. Demobilization of the Transload Site began on February 22, 2016. Demobilization activities consisted of dismantling the settling pond, site sweeping, cleaning of the apron and fabric, pulling the steel fender piling installed at APM Terminals as part of the project, loading out ecology blocks and baker tanks, and removing the wheel wash. Orion cleaned the pavement

before dismantling the water treatment system and collected samples from the granulated activated carbon and the sand filter media to determine appropriate media disposal. Detected concentrations of TBT were less than the TBT bulk SL of 73 µg/kg and were transported for landfill disposal at LRI.

On March 30, 2016, the OSC inspected the APM Terminals and the Pier 4 site, and approval of the completion of the Phase 1 Removal Action was provided via an email to the Port on April 1, 2016 (Parker 2016c).

6.0 Water Quality Monitoring

6.1 OBJECTIVES

The objective of water quality monitoring is to ensure that over-water and in-water activities were accomplished in a manner that provided protection of the environment and minimized the release of turbidity in the Blair Waterway during all removal action activities. The water quality monitoring activities were conducted in accordance with Appendix B of the RAWP and the 401 Memorandum, with the exception of those adaptive management decisions captured in meetings and conference calls with the Port, Orion, and the Agencies between June and September 2015. Water quality monitoring forms, summary report forms, and all analytical data for water quality monitoring were provided in conjunction with this TCRACR to USEPA on a separate disc.

6.2 CHANGES TO THE WATER QUALITY MONITORING PROGRAM

Following the selection of the Phase 1 contractor and the development of the actual dredge, transload, and dewatering treatment approach and sequence, the Port organized a series of conference calls and meetings to modify the water quality monitoring approach and customize it to the actual timing and sequence of work activities.

On June 8, 2015, Figure B.6 from Appendix B of the RAWP was updated to clarify the steps to follow if a turbidity exceedance occurred during Tier 2 Routine monitoring. On August 6, 2015, an updated WQMPP water quality sampling form, dredge return sampling form, and a chemical testing tracking form were finalized and sent out to the Agencies. On August 20, 2015, revised WQMPP flowchart figures were sent out to the Agencies. The primary change was that if a turbidity measurement was at or greater than 5 nephelometric turbidity unit (NTUs; not an exceedance) during dredge return water monitoring, the Port project manager and USEPA must be notified to assess system performance and the reason for the elevated turbidity.

On September 3, 2015, Figure B.7 from Appendix B of the RAWP was updated to clarify that during Tier 1 Intensive monitoring during dredge return water monitoring, the use of “days” of operation of sample collection represent independent, non-consecutive days of treatment system discharge, because the treatment system was not continuously operated, and treatment was done in batches.

Finally, on October 8, 2015, Figure B.5 from Appendix B of the RAWP was updated to clarify that the acute compliance station water quality grab sample submitted for TBT chemical analysis should be the sample that had the greatest turbidity measurement after the subtraction of the background station turbidity measurement.

In addition to changes to the water quality monitoring process, Orion developed new and updated water quality monitoring summary report forms and sample analysis tracking sheets that would accompany the weekly summary reports sent out.

6.3 MONITORING DURING TRIBUTYL TIN-CONTAMINATED DREDGING—TIER 1

Per the RAWP and modifications as described above, for all dredging of TBT-contaminated sediment when not in Tier 1 Routine monitoring, Tier 1 Intensive monitoring was performed. This consisted of twice daily turbidity monitoring at all Early Warning, Acute Compliance, Chronic Compliance, and Background Stations, during the first 7 days of dredging; collection of water quality grab samples once daily at all compliance and background stations; and analysis of the acute compliance station sample with the greatest turbidity measurement on Days 1, 3, and 5 of dredging. There were no exceedances of turbidity during any Tier 1 monitoring conducted during these activities and no exceedance of TBT for any analyzed water sample.

6.4 MONITORING DURING ALL IN-WATER ACTIVITIES—TIER 2

Per the RAWP and modifications as described above, for all in-water work activities, including vibratory pile extraction, navigation light pile installation, and riprap removal, dredging of clean sediment, and dredging of TBT-contaminated sediment when Tier 1 Intensive monitoring was not required, Tier 2 Routine monitoring was performed. Tier 2 consisted of twice-daily turbidity monitoring at all Early Warning, Acute Compliance, Chronic Compliance, and Background Stations, 2 days per week. There were no exceedances of turbidity during any Tier 2 monitoring conducted during these activities.

6.5 MONITORING DURING DREDGE RETURN WATER MONITORING—TIER 1

Per the RAWP and modifications as described above, for all dredge return water monitoring when not in Tier 2 Routine monitoring, Tier 1 Intensive monitoring was performed, which consisted of daily turbidity measurements collected at the influent and end-of-pipe, and collection and analysis of influent and effluent samples on Days 1, 2, and 3 and collection and archival of influent and effluent samples on Days 4, 5, 6, and 7. There were no exceedances of turbidity during any Tier 1 monitoring conducted during these activities.

There were no exceedances of turbidity; however, there was one slight exceedance of the chronic criterion of 0.0074 micrograms per liter ($\mu\text{g/L}$) in a sample collected from the dredge treatment return water system end-of-pipe, as described in Section 6.7.1.

6.6 MONITORING DURING DREDGE RETURN WATER MONITORING—TIER 2

Per the RAWP and modifications as described above, for all dredge return water monitoring when not in Tier 1 Intensive monitoring, Tier 2 Routine monitoring was performed, which consisted of daily turbidity measurements collected at the influent and end-of-pipe, twice per week. There were no exceedances of turbidity during any Tier 2 monitoring conducted during these activities.

6.7 RESPONSE ACTIONS TO WATER QUALITY MONITORING

6.7.1 Water Quality Exceedance

On December 14, 2015, the Port received the analytical results from the samples collected on December 1, 2015, which consisted of water from the second to last pass of the central hot spot. The sample that was collected from the dredge treatment return water system end-of-pipe, 120115DRAC2, had a detected concentration of 0.023 µg/L, which is less than the acute standard of 0.42 µg/L, but greater than the chronic standard of 0.0074 µg/L. Following a call with the USEPA on December 14, 2015, Orion was directed to collect a treated water sample from the system while in circulation to verify system performance and compliance with the water quality criteria. Additionally, Water Tectonics backflushed the carbon filter. A treatment system water effluent sample was collected on December 15, 2015, for TBT analysis, and the result received on December 23, 2015, was non-detect, which indicates effective treatment. Subsequent days of dredge return water discharge from the treatment system included the collection of end-of-pipe water samples for TBT analysis, and the collection and archival of water quality samples from the 150-foot chronic point of compliance boundary. The chronic samples were not analyzed because the effluent sample was non-detect for TBT.

7.0 Post-Dredge Confirmational and Perimeter Sediment Sampling

All field sampling forms and post-dredge analytical data were provided in conjunction with this TCRACR to USEPA on a separate disc.

7.1 FIRST SAMPLING EVENT

7.1.1 Summary of Sampling Methodology

The approved RAWP specified that post-dredge sampling would occur in each DMU and would include collection of the top 0- to 10-centimeter (cm) interval for immediate (accelerated 3- to 4-day turn-around-time) bulk TBT analysis to confirm that the post-dredge sediment surface had TBT concentrations less than the SL. In the non-hot spot areas, samples would also be collected from the underlying 10- to 20-cm interval and immediately analyzed to provide information on the vertical extent of the dredge residuals layer and potential TBT exceedances if TBT exceeded the SL in the 0- to 10-cm interval. The RAWP specified an additional grid of 22 perimeter locations outside of the DMUs, outside and waterward of the Phase 1 dredge prism, where samples would be collected from the top 0- to 10-cm interval for immediate bulk TBT analysis.

On November 30, 2015, a final additional confirmational sampling approach memorandum was sent to the USEPA and DMMO (Floyd|Snider 2015b). The memorandum, which was approved by the Agencies in a meeting on November 23, 2015, summarized an approach that added the following components to the RAWP's post-dredge sampling program:

- Collection and analysis of the 10- to 20-cm interval in the three hot spot locations.
- Collection and analyses of porewater TBT and total organic carbon (TOC) in the five perimeter 0- to 10-cm samples closest to the hot spots, the three hot spot 0- to 10-cm samples, and the three hot spot 10- to 20-cm samples to assess the potential bioavailability of TBT if bulk TBT concentrations exceeded the SL.
- Collection and analysis of the 0- to 10-cm interval at three additional discretionary sample locations to verify that dredge residuals had not migrated laterally.
- Collection and analysis of the 0- to 1-foot interval for bulk TBT in all non-hot spot locations.
- Collection and analysis of porewater and TOC in the 0- to 10-cm sample intervals collected from the 14 non-hot spot locations to assess the potential bioavailability of TBT if bulk TBT concentrations exceeded the SL.

Section 4.2.1 of the RAWP described that up to five additional discretionary perimeter sample locations could be added in coordination with USEPA based on the results of the post-dredge confirmational sampling results within the hot spot areas and/or water quality monitoring results during dredging. In coordination with USEPA, prior to post-dredge confirmational sampling, five additional discretionary sample locations were added, as shown on Figure 7.1. PR-23, located to south of PR-22 at the southern end of the pier, was added in the event that PR-22 did not

adequately bound TBT contamination. Two locations (PR-24 and PR-25) were added to the north of the northern end of the dredge prism due to concerns with bucket closure and observed turbidity during dredging in this area. PR-26 was added to the same perimeter unit as PR-19 in order to ensure that the “ridge” of accumulated sediment that was observed in the post-dredge bathymetric survey was adequately characterized. PR-19 was then shifted approximately 30 feet to the northwest. Finally, due to potential concerns of TBT contamination in sediment located below the Transload Site outfall that discharged the treated dredge return water, a surface sediment sampling location, OF-1, was added. The surface sediment sample was collected approximately 12 feet off the outfall associated with the dredged material water treatment system, as required by USEPA.

7.1.2 Summary of Field Activities

Following completion of all dredging of TBT-contaminated sediment, grab samples were collected in all DMUs and perimeter units on January 4 and 5, 2016 (Appendix A, Photographs 27 through 30). The DMU samples were collected via a power grab sampler deployed off a vessel operated by Research Support Services and the perimeter samples were collected via a Van Veen grab sampler deployed off a vessel, also operated by Research Support Services. Sample collection was performed according to the sampling procedures described in the Post-Dredge Confirmational Sampling Plan (Appendix A of the RAWP). Figure 7.1 show the proposed sample locations from the RAWP and the actual locations where samples were collected. The samples were collected from the depths described in Section 7.1.1 and visually classified according to the Unified Soil Classification System. The sediment from each grab sample location was placed in a stainless steel bowl and homogenized. The homogenized sediment was then placed into glass jars, labeled, and stored in ice chests. Field decontamination procedures were followed in accordance with the methods described in the Post-Dredge Confirmational Sampling Plan (Appendix A of the RAWP). Samples were delivered on ice to Analytical Resources, Inc. (ARI), under standard chain-of-custody procedures, and analyzed for bulk TBT, porewater TBT, and TOC.

Analytical results, described in detail in Section 7.5.1, indicated that additional dredging needed to be conducted in DMUs 3, 4, 6, 7, and 8 in order to remove sediment that exceeded the SLs for both porewater and bulk TBT, as well as dredging in the perimeter units.

7.2 SECOND SAMPLING EVENT

7.2.1 Summary of Sampling Methodology

The sampling approach and sampling methods for the second event were outlined in the January 21, 2016, email (Massingale 2016) as well as a January 21, 2016, *Post-Dredge Confirmational Sampling Plan Addendum Memorandum* (Floyd|Snider 2016). The following bullets describe the second sampling approach, as transmitted to the agencies. The USEPA directed the following actions:

- Once additional dredging of DMUs 3, 4, 6, 7, and 8 is complete, a subsurface coring event will be conducted.

- No confirmational sampling of the post-dredge surface will be required for the grids represented by the PR- sampling locations.
- In DMUs 3, 4, 6, 7, and 8, 6-foot cores will be advanced in an attempt to vertically delineate remnant TBT and provide the Port and Agencies with a slightly earlier determination that the subsurface sediments are clean.
 - In DMUs 3, 7, and 8, the 2- to 4-foot samples will be collected and analyzed for porewater TBT. If the cores can be advanced to 6 feet bml, samples will be collected from the 4 -to 6-foot interval and analyzed for TBT, if necessary, based on the results of the overlying 2- to 4-foot sample.
 - In DMUs 4 and 6, samples will be collected from the 0- to 10-cm interval; the 10-cm to 2-foot interval; the 2- to 4-foot interval; and the 4- to 6-foot interval. In order to achieve the necessary volume for porewater analysis in the 0- to 10-cm interval (and to obtain extra volume), the 0- to 10-cm interval will be collected via grab sampling. The top three surface intervals will be submitted for immediate analysis of porewater TBT and the 4- to 6-foot interval will be archived and will be analyzed if the overlying 2- to 4-foot sample interval contains a porewater concentration greater than the TBT porewater SL of 0.15 µg/L. Sediment samples will also be collected and held for bulk TBT analysis in case sediment cores do not yield sufficient volumes of porewater for chemical analysis.

7.2.2 Summary of Field Activities

While Orion was dredging the perimeter units, the second sampling event was conducted on January 29 and 30, 2016 (Appendix A, Photographs 31 and 32). Grab sampling and processing procedures were conducted in accordance with Appendix A of the Post-Dredge Confirmational Sampling Plan (Appendix A of the RAWP) and as summarized in Section 7.2.1. The core sampling and processing procedures were conducted in accordance with the *Post-Dredge Confirmational Sampling Plan Addendum Memorandum* (Floyd|Snider 2016). All sample collection, homogenization, chain-of-custody procedures, and decontamination were conducted as summarized in Section 7.1.2.

Analytical results, described in detail in Section 7.5.2, indicated that additional dredging needed to be conducted in order to remove sediment that exceeded the SLs for both porewater and bulk TBT in DMUs 3, 4, 6, 7, and 8.

7.3 FINAL SAMPLING EVENT

7.3.1 Summary of Sampling Methodology

The sampling approach for the final event was also described in the January 21, 2016, email (Massingale 2016) and 2016 *Post-Dredge Confirmational Sampling Plan Addendum Memorandum* (Floyd|Snider 2016) and specified that once dredging was completed in the middle perimeter grids (PR-9 through PR-21 and PR-26) and Orion began to dredge the outer and southern perimeter grids (PR-4 through PR-8 and PR-23), Floyd|Snider would conduct a second

coring event consisting of surface and subsurface sampling of DMUs 3, 4, 6, 7, and 8. However, because it was not possible to collect a sufficient volume of porewater from the sediment cores in the second event, it was determined via a conference call with the Port and the Agencies on February 8, 2016, that in the final event, only the surface 0- to 10-cm sample, collected via power grab, would be analyzed for porewater TBT.

7.3.2 Summary of Field Activities

While Orion was dredging the outer perimeter units, the final sampling event was conducted on February 9, 2016 (Appendix A, Photograph 33). Grab sampling and processing procedures were conducted in accordance with the Post-Dredge Confirmational Sampling Plan (Appendix A of the RAWP) and as summarized in Section 7.1.2.

Analytical results, described in detail in Section 7.5.3, indicated that an additional dredge pass needed to be conducted in DMUs 3, 4, 6, 7, and 8 in order to remove sediment that exceeded the porewater TBT SL. However, because subsurface bulk TBT results from the previous events were less than the bulk SL of 73 µg/kg, additional sample collection was not required.

7.4 SUMMARY OF OBSERVATIONS IN ALL SAMPLING EVENTS

Sediment observed in the majority of the grab samples was dark gray, poorly graded fine to medium sand and silty sand. Many of the sample grabs were overlain by a fine brown silt layer that was presumed to be dredge residuals, although there was no correlation between the presence of the surface silt layer and TBT concentrations. No odor or anthropogenic debris were noted.

7.5 SUMMARY OF ANALYTICAL RESULTS

7.5.1 First Sampling Event

7.5.1.1 Post-Dredge Confirmational Samples

The analytical results for the post-dredge confirmational samples are shown in Table 7.1 and Figure 7.2. For bulk TBT in the post-dredge confirmational sampling locations, there were two locations with exceedances of the bulk TBT SL of 73 µg/kg: DMU 3 located north of the central hot spot, and DMU 6 located within the central hot spot. All other locations had bulk TBT concentrations less than the SL. For DMU 6, the 0- to 10-cm interval exceeded the bulk TBT SL with a concentration of 120 µg/kg, but the 10- to 20-cm interval (61 µg/kg) did not exceed the SL. Therefore, the bulk TBT was vertically delineated at DMU 6 and did not indicate missed inventory. The 120 µg/kg exceedance in the 0- to 10-cm interval was also less than the Project Action Level of 219³ µg/kg. For DMU 3, the 0- to 10-cm interval exceeded the bulk TBT SL with a concentration of 120 µg/kg and the 10- to 20-cm interval also exceeded the SL with a

³ The Project Action Level of 219 µg/kg for bulk TBT is three times the DMMP SL of 73 µg/kg and was proposed in the RAWP.

concentration of 320 µg/kg. Although this was greater than the Project Action Level of 219 µg/kg, the 0- to 1-foot sample was less than the bulk TBT SL with a concentration of 44 µg/kg.

For porewater TBT in the post-dredge confirmational sampling locations, there were exceedances of the porewater TBT SL of 0.15 µg/L in five of the nine sampled locations in the 0- to 10-cm interval (i.e., DMUs 3, 4, 6, 7, and 8). The two central hot spot locations that were sampled for porewater TBT in the 10- to 20-cm interval both exceeded the porewater TBT SL and the concentration at DMU 6 was the greatest porewater result with a concentration of 2.2 µg/L.

7.5.1.2 Perimeter Samples

The analytical results for the perimeter samples are shown in Table 7.1 and Figure 7.2. For bulk TBT in the perimeter sampling locations, 8 of the 26 perimeter surface samples (i.e., PR-10, PR-11, PR-12, PR-16, PR-17, PR-18, PR-19, and PR-26) exceeded the SL with concentrations ranging from 77 to 170 µg/kg, and all were less than the Project Action Level of 219 µg/kg.

7.5.2 Second Sampling Event

The analytical results for the post-re-dredge confirmational samples are shown in Table 7.1 and Figure 7.3. For bulk TBT, samples were analyzed from the 10-cm to 2-foot interval and the 2- to 4-foot interval. All the results analyzed were non-detect with the exception of a 10-cm to 2-foot sample at DMU 8, which had a low-level bulk TBT concentration of 5.2 µg/kg. For porewater TBT, only sample volume from two locations was able to be extracted for porewater (i.e., the 0- to 10-cm intervals DMU 4 and DMU 6 collected via grab sample). Both locations had concentrations of porewater TBT that exceeded the porewater SL, with the greatest concentration at DMU 6 in the 0- to 10-cm interval with a concentration of 1.4 µg/L.

7.5.3 Final Sampling Event

The analytical results for the final post-re-dredge confirmational samples are shown in Table 7.1 and Figure 7.3. Porewater results ranged from 0.19 to 0.61 µg/L, with all exceeding the TBT porewater SL. However, each concentration dropped from previous event results and, although the surface 0- to 10-cm water porewater result exceeded the porewater SL of 0.15 µg/L, subsurface bulk TBT results were less than the bulk SL of 73 µg/kg. Based on these results, one additional dredge pass was conducted and no additional sampling was required.

8.0 Waste and Sediment Transportation and Disposal Activities

The waste and recycled material generated from the Phase 1 Removal Action included debris and TBT-contaminated sediment. A summary of these waste streams and their final location of disposition is provided below. A detailed summary is included in Table 8.1.

Waste Stream	Quantity (method)	Disposal or Recycling Facility
Asphalt	3,885 tons (recycled)	Rhine Yard
Concrete	32,244 tons (recycled)	Lloyd, Enterprises, Inc.
Metal	1,798 tons (recycled)	Schnitzer Steel Industries/Simon Metals/Tacoma Metals
Clean Sediment	6,550 CY (open water disposal)	Commencement Bay Non-Dispersive Disposal Site
Creosote	218 tons (disposed)	Roosevelt Landfill
Deck Ballast	1,746 tons (disposed)	PCRCD/LRI Landfill
TBT-Contaminated Sediment	109,440 tons (disposed)	PCRCD/LRI Landfill

Abbreviation:

PCRCD Pierce County Recycling, Composting, and Disposal

9.0 Quality Assurance/Quality Control

Per AOC #2, Floyd|Snider will retain all project documents including data, reports, and email communications for 10 years after USEPA has provided notice that all work has been fully performed in accordance with AOC #2, unless instructed otherwise by USEPA or the Port.

9.1 SUMMARY OF QUALITY CONTROL/QUALITY ASSURANCE REQUIREMENTS

Per the RAWP, the chemistry quality assurance (QA)/quality control (QC) procedures followed Puget Sound Estuary Program and the QA/QC criteria established for the DMMP program and as specified in AOC #2.

QA/QC procedures included the use of laboratory QA samples. Surrogates were required for every sample, including matrix spike (MS) samples, blanks, laboratory control samples (LCSs), and standard reference materials. MS samples and matrix spike duplicates (MSDs) were analyzed for every 20 samples received. Matrix triplicates were analyzed for conventional parameters.

All data were reviewed for quality, compliance with analytical method requirements and the RAWP data quality objectives, and completeness. All samples were diluted and re-analyzed if target compounds were detected at levels that exceeded their respective established calibration ranges. Any cleanups were conducted prior to the dilutions. Re-analyses were performed if surrogate, internal standard, or spike recoveries were outside of the data quality objective parameters.

9.1.1 Summary Water Quality Monitoring Quality Assurance

During water quality monitoring, as coordinated with USEPA during construction, the Port inspector oversaw and confirmed all turbidity meter calibration efforts and documented the contractor's turbidity calibration of the turbidity meter in a project logbook. The turbidity meter data logger also recorded all calibrations and turbidity measurements.

Before submittal to the USEPA, the Port reviewed the water quality monitoring forms to ensure that equipment calibration was documented, and checked the results for any errors, inconsistencies, or inaccuracies. After receipt of final water quality TBT analytical data and before submittal of water quality results to USEPA, Floyd|Snider performed a Compliance Screening, Tier 1 data quality review of the TBT water quality to confirm that the data were reliable to support agency decision-making.

Compliance Screening, Tier 1 data quality reviews were performed by Chell Black of Floyd|Snider on TBT data resulting from laboratory analysis of 39 water quality samples collected between September 15, 2015, and December 30, 2015. The analytical data were validated in accordance with the 2014 USEPA *National Functional Guidelines for Superfund Organic Methods Data Review*. Based on the data quality review, data were determined to be of acceptable quality for use as reported by the laboratory.

9.1.2 Summary of Post-Dredge Confirmational Sampling Quality Assurance

Compliance Screening, Tier 1 data quality reviews were performed by Floyd|Snider on TBT data resulting from laboratory analysis of sediment, porewater, and rinse blank samples collected during the three post-dredge conformational sampling events conducted between January 4 and February 9, 2016. The analytical data were validated in accordance with the 2014 USEPA *National Functional Guidelines for Superfund Organic Methods Data Review*.

At the completion of the first post-dredge conformational sampling event, a total of 78 sediment samples and one rinsate sample were delivered to ARI, in Tukwila, Washington, on January 4 and 5, 2016, in five sample delivery groups (SDGs; ATQ1, ATQ2, ATR3, ATR4, and ATR5). A total of 66 of the submitted sediment samples were selected for chemical analysis of TBT by USEPA 8270D-SIM on an expedited turnaround time. At that time, an additional 17 sediment samples were submitted to Materials Testing and Consulting (the laboratory subcontracted to ARI for porewater analyses) for porewater extraction. Materials Testing and Consulting was able to extract porewater from all 17 samples and return them to ARI on January 6, 2016, under SDGs ATT1 and ATT4 for chemical analysis of TBT by USEPA 8270D-SIM. The remaining 12 of the 78 sediment samples and the rinsate sample were re-assigned to SDGs ATQ3 and ATR6 for standard turnaround time chemical analysis of TBT by USEPA 8270D-SIM.

At the completion of the second post-dredge conformational sampling event, a total of 22 sediment samples and one rinse blank sample were delivered to ARI on February 1, 2016, in one SDG, AVD6. At that time, 12 of the 22 sediment samples were placed on hold and 10 samples were submitted to Materials Testing and Consulting for porewater extraction. Materials Testing and Consulting was able to extract porewater for three samples and return them to ARI in SDG AVG0 for chemical analysis of TBT by USEPA 8270D-SIM. Seven sediment samples were removed from hold on February 3, 2016, and reassigned to SDG AVG5 for chemical analysis of bulk TBT by USEPA 8270D-SIM. Three additional sediment samples were removed from hold on February 8, 2016, and reassigned to SDG AVQ0 for chemical analysis of bulk TBT by USEPA 8270D-SIM. The rinse blank sample was assigned to a separate SDG, AVE0, for chemical analysis of aqueous TBT by USEPA 8270D-SIM.

At the completion of the third and final post-dredge conformational sampling event, a total of six sediment samples and one rinse blank sample were delivered to ARI on February 9, 2016, in one SDG, AVR8. At that time the six sediment samples were submitted to Materials Testing and Consulting for porewater extraction. Materials Testing and Consulting was able to extract porewater from all six samples and return them to ARI on February 12, 2016, under SDG AVT5 for chemical analysis of TBT by USEPA 8270D-SIM. The rinse blank sample remained in the original SDG, AVR8, for chemical analysis of aqueous TBT by USEPA 8270D-SIM.

For all SDGs associated with all three post-dredge conformational sampling events, the analytical holding times were met and the method blanks had no detections. LCS and laboratory control sample duplicate (LCSD) recoveries, and LCS/LSCD relative percent difference all met USEPA requirements.

The tripropyl tin chloride surrogate recovery for sample DMU1-10-20 was just outside the laboratory control limits low; it is with professional judgment that the detected sample result be qualified "J" as estimated.

The tripropyl tin chloride and triphenyl tin chloride surrogate recoveries for sample DMU11-0-10 were just outside the laboratory control limits low. Based on USEPA guidelines, the non-detect sample result was qualified "UJ" as estimated.

The MS recovery for sample DMU3-0-1 was outside laboratory control limits high; however, the MSD recovery was within laboratory control limits, resulting in the MS/MSD relative percent difference being outside laboratory control limits high. Due to the non-homogenous nature of sediment samples, it was with professional judgment that only the sample result for DMU3-0-1 was qualified "J" as estimated based on the MS/MSD recovery information.

Sample DMU3-10-20 had a concentration that exceeded the range of the detector during the initial analysis. This initial result has been assigned a Do Not Report (DNR) qualifier, as a more appropriate result was reported from the dilution analysis.

A total of 11 samples, DMU3-0-10, DMU6-0-10, DMU6-10-20, PR16-0-10, PR17-0-10, PR21-0-10, DMU6-0-10, DMU104-0-10, DMU6-0-10cm, DMU7-0-10cm, and DMU8-0-10cm had TBT porewater concentrations that exceeded the linear calibration range of the detector during the initial sample analysis. These initial sample results were assigned a DNR qualifier, as a more appropriate result was reported from the dilution analysis for each of these samples.

Data were determined to be of acceptable quality for use as qualified above

10.0 Post Removal Site Controls

As described in Section 5.7, in order to improve slope stability and prevent erosion of the slope in front of the substation, slope stabilization measures were implemented consisting of leaving concrete piles in place and placing remnant piling and geotextile fabric and sandbags on the slope. Depending on the performance of the temporary controls prior to Phase 2, the Port has plans to place rock to stabilize the bank as part of Phase 2 and prior to bank dredging. Because the placement of rock would be a contingent post-Phase 1 removal action site control, and would not be occurring under USEPA authority, turbidity monitoring would be required during placement, per the Phase 2 WQMPP and Phase 2 401 Certification, as the substantive requirement for a permit.

11.0 Community Relations

Community relations during the Phase 1 Removal Action were coordinated by the OSC and were supported by the Port. Prior to construction, the OSC posted the RAWP on the USEPA's website for public review. The Port also notified the public and various stakeholders regarding the start of construction and planned work activities via a news release that was published in the Tacoma News Tribune in April 2015. A second Port news release to notify the public of the beginning of contaminated sediment dredging was published in the Tacoma News Tribune in September 2015.

During construction, the OSC periodically provided the public with updated information at the USEPA's Blair Waterway TBT Removal Action website, including pollution reports documenting the progress of the removal action and photographs of site activities. The OSC and the Port provided tours to agencies and stakeholders and were interviewed for television news during construction.

12.0 Overview of Site Safety

The OSC maintained ultimate authority and responsibility for site safety during the removal action. Daily safety meetings were conducted by Orion at the beginning of each day of site work and were attended by all personnel present. During the daily safety meetings, the crew discussed the planned activities for that day and any task-specific health and safety issues. The daily safety meeting also included a review of any health and safety issues from the previous day. Orion submitted a Health and Safety Plan prior to construction. The Health and Safety Plan has been provided in conjunction with this TCRACR to USEPA on a separate disc.

The physical hazards at the Site included slips, trips, falls, overhead hazards from equipment, and wildlife (insects). The primary environmental hazard was weather extremes. The minimum level of personal protective equipment for the Site was Level D, including steel-toed safety boots, hardhat, safety glasses, and high-visibility clothing. When motorized equipment was used, workers on-site monitored the equipment's movement. Personnel conducting in-water work or any work within 15 feet of the waterway also wore personal flotation devices.

The primary chemical hazards associated with the Site were inhalation and direct contact exposure to TBT-contaminated sediments. Because the sediments were mostly handled while wet, with BMPs implemented to minimize splashing, the risk of inhaling sediments was minimal. Workers generally used equipment to dredge, move, or otherwise handle TBT-contaminated sediments and did not come into direct contact with sediment. The individuals that had direct contact with the TBT-contaminated sediments were the Floyd|Snider personnel that conducted the post-dredge confirmational and perimeter sediment sampling. All Floyd|Snider personnel were 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) trained. No eating, drinking, or smoking was allowed in the work area.

In order to protect workers and bystanders during pile removal, the safety zone surrounding the work area was expanded while removing long and heavy piles with the potential to split at their splice repair joints. During all dock demolition, due to the large swing radius of the demolition equipment and tight turns on the adjacent truck access road, escorts were required for any visitors who were on-site for observation. The perimeter fence adjacent to the access road was marked with high-visibility orange construction barrels to minimize the potential for vehicle collisions.

At the APM Terminals Transload Site, Orion and USEPA expressed concern about the height of stacked containers. The Port coordinated with APM Terminals and it was decided that the containers were stacked in a longshore-approved formation and APM Terminals decided not to move containers when Phase 1 Removal Action workers were present.

Injuries incurred by workers during pier demolition and dredging were generally minor; however, two workers sustained injuries that were determined to be sufficiently serious to report to the Occupational Safety and Health Administration. One injury occurred during pile removal and was caused by falling concrete pieces. A second injury occurred when a worker was hit by falling

concrete during pier demolition. The pier demolition approach was modified as a result of these injuries. Stray electrical current was also found to be entering the crane barge during construction. Although the current was detectable to one worker who contacted the barge, no major shocks were reported.

13.0 Observations and Lessons Learned

In general, the Phase 1 Removal Action was conducted in accordance with the RAWP and the 401 Memorandum. However, during construction, conditions arose that resulted in adaptive management by the Port and USEPA, as well as useful lessons learned for agencies, contractors, and consultants to be applied on future dredging projects. The bullets below present lessons learned, as well as adaptive management approaches:

- **Engineering, environmental, and agency collaboration allowed fast-paced USEPA process in parallel with design.** The use of working technical meetings and evaluation presentations to USEPA, DMMP representatives, and resource agencies supported a collaborative project approach. This process ensured everyone was informed with the same information as technical approaches were developed, rather than waiting until document submittals for agency input. This collaborative approach resulted in saving time and money in project coordination and design, and was continued during construction to address unexpected conditions and BMPs.
- **Evaluation of dredging BMPs in context with site conditions and other regional projects allowed for optimization of site-specific construction methods.** The ability to analyze common dredge BMPs, within the context of site conditions, and present the predicted effectiveness of the BMPs allowed for the joint identification of BMPs and construction methods that were tailored to the project. The project greatly benefited from lessons learned on other regional contaminated dredging projects. One example of this process was the use of a floating boom-supported silt curtain to protect water quality during hot spot dredging.
- **Water quality chemical testing for low-level TBT was expensive and did not provide useful insight on water quality compliance or agency decision making.** Based on the lack of TBT detections or exceedances during dredging, even when compared to the acute and low-level chronic water quality standards, the complex analytical program did not provide useful information on project BMP compliance and potential water quality impacts. Testing required constant Contractor, Port, and Agency coordination, which added substantial project costs when turbidity monitoring would have been an appropriate surrogate. Additionally, the Dredge Elutriate Testing (DRET) and the U.S. Army Corps of Engineers' DREDGE modeling performed prior to construction to assess the potential for acute and chronic water quality effects were good predictors of the potential for water quality impacts within the immediate vicinity of dredging and at the points of compliance.
- **Strategic placement of the Transload Site close to Pier 4 met the definition of a contiguous site.** The use of APM Terminals as the Transload Site met the two criteria that were required to consider it part of the CERCLA Phase 1 Removal Action site: (1) it was Port-owned, and (2) it was contiguous with the Phase 1 Removal Action site footprint. Because it was part of the Phase 1 Removal Action site, the transloading and dewatering activities were exempt from state and local permits. This resulted in

the Port's and USEPA's ability to proceed in a timely fashion with the Time Critical Removal Action and meet USEPA's removal action goals, as the Port did not have to separately permit the Transload Site for the in-water pile installation activities that were necessary for the transload of the dredged sediment.

- **Developing a shared understanding of post-dredge confirmational sampling results scenarios facilitated efficient agency communications and decisions during construction.** There is a balance between providing flexibility to support dynamic, informed decision-making based on the results of post-dredge confirmational sampling, and minimizing construction uncertainty and project schedule and cost risk. For the Phase 1 Removal Action, a range of possible response actions were developed with the agencies based on various confirmational sampling results, which provided a structure to predict possible additional removal actions (e.g., additional dredging, sand placement). This also allowed for a weight of evidence approach with the agencies that was informed by actual construction progress, site conditions, and data.
- **The consequences of long-term unprotected slope exposure should be incorporated into the initial bid document.** Because armoring could not be placed on the recently dredged slope (because of the potential to impact downslope contaminated dredging), slope erosion and localized sloughing occurred, which led to more material requiring excavation than originally estimated. The dredge quantity estimate should have accounted for more volume from sloughing and the contract documents should have more clearly identified the potential for erosion and sloughing so that the contractor was aware of this and it could have informed the frequency and type of on-going verification hydrographic surveying performed.
- **The settling pond at the Transload Site was difficult to maintain and should have been designed better to accommodate the removal of sediment.** During sediment transloading and dewatering, the setting pond was often near capacity with sediment, associated water, and rainwater and was not as effective for primary settling as expected during the design stage. The settling pond design could have included more distinct cells at the input location to settle out more sediment and a steel plate above the liner in the primary settling cell would have enabled heavy machinery to scoop out sediment on a regular basis without concern for puncturing the plastic liner. However, even though the primary settling pond filled with more sediment than anticipated, the dredge return water treatment train still worked to specifications and resulted in system discharges that were in compliance with the required water quality standards.

14.0 Summary and Conclusions

The purpose of this document was to describe the Phase 1 Removal Action, implemented by the Port to address TBT-contaminated sediments present at Pier 4, located within Husky Terminal, on the west side of the northern portion of the Blair Waterway, adjacent to Commencement Bay in Tacoma, Washington. Between April 2015 and March 2016, the Port performed the Phase 1 Removal Action for removal of TBT-contaminated sediment at Pier 4. In total, approximately 71,000 CY (109,440 tons) of TBT-contaminated sediment was dredged, transloaded at the APM Terminals Transload Site, and then trucked to LRI landfill in Graham, Washington for disposal.

Following the completion of all dredging, post-dredge hydrographic surveys confirmed that design elevations and tolerances specified in the RAWP and the contract design and specifications were met. Post-dredge confirmational sampling provided verification that TBT-contaminated sediments were removed. Substantial completion and USEPA approval of the contaminated sediment removal occurred on February 18, 2016 (Parker 2016a). On March 30, 2016, the Phase 1 Removal Action was successfully completed.

15.0 References

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Pier 4
Phase 1 Removal Action
Time Critical Removal
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Tables

Table 3.1
Chronology of Removal Action Activities

Removal Action Activity	Start Date	Completion Date
Mobilization and Preparation		
Mobilize to Site	April 10, 2015	April 28, 2015
Pre-Dredge Hydrographic Survey	April 13, 2015	May 1, 2015
Set-Up Fencing, Ecology Blocks, and TESC	April 17, 2015	April 20, 2015
Utility Locate	April 17, 2015	April 22, 2015
Receive and Set-Up Floating Debris Boom	April 20, 2015	April 27, 2015
Set-Up Construction Trailers	April 21, 2015	April 21, 2015
Mobilize Demolition Equipment	April 22, 2015	April 28, 2015
Pier Demolition		
Free Fender System from Dock Face	May 1, 2015	May 6, 2015
Potholing Utilities and Cutting and Capping	May 1, 2015	May 12, 2015
Asphalt Removal	May 1, 2015	May 15, 2015
Ballast Removal	May 11, 2015	May 26, 2015
Demolition of Bullrail, Deck Panels, and Caps	May 11, 2015	August 12, 2015
Demolition of Bulkhead	July 27, 2015	August 19, 2015
Navigation Light Relocation		
Relocation of Light Tower #4	July 22, 2015	July 29, 2015
Relocation of Light Tower across Blair Waterway	November 4, 2015	December 31, 2015
Vibratory Pile Extraction and Broken Pile Removal		
Timber and Steel Pile Extraction	June 15, 2015	June 16, 2015
Concrete Pile Extraction	June 15, 2015	August 19, 2015
Broken Piling Removal	August 31, 2015	September 9, 2015
Transloading at APM Terminals		
Crack Sealing	August 5, 2015	August 7, 2015
Mooring Piling Installation	August 24, 2015	August 25, 2015
Perimeter Fence and Settling Pond Setup	August 18, 2015	September 8, 2015
Yard Pumping System Installation	September 1, 2015	September 10, 2015
Sealing Storm Drains and Catch Basins	September 2, 2015	September 10, 2015
Temporary Power Installation	August 23, 2015	September 9, 2015
Water Treatment System Setup	August 31, 2015	August 31, 2015
Wheel Wash Construction	August 31, 2015	September 3, 2015
Transload of Contaminated Sediment	September 16, 2015	February 26, 2016
Clean Sediment Dredging		
Riprap Removal	July 28, 2015	August 13, 2015
Pre-Dredge Hydrographic Surveying	August 12, 2015	August 18, 2015
Dredging of Clean Top of Slope Sediment	August 24, 2015	September 14, 2015
In-Progress and Post-Dredge Surveying	September 1, 2015	September 14, 2015
Disposal at WDNR Site	August 24, 2015	September 14, 2015

Time Critical Removal Action
Completion Report

Table 3.1

Table 3.1
Chronology of Removal Action Activities

Removal Action Activity	Start Date	Completion Date
Contaminated Sediment Dredging		
Construction of the Top Hat	September 2, 2015	September 11, 2015
Dredging of Initial Contaminated Sediment	September 15, 2015	December 30, 2015
Dredging of Initial Hot Spot Sediment	November 4, 2015	December 30, 2015
Post-dredge Hydrographic Survey	December 31, 2015	December 31, 2015
Post-Dredge Piling and Debris Removal	January 11, 2016	January 14, 2016
Additional Dredging of Contaminated Sediment (including hot spots)	January 18, 2016	February 18, 2016
Final Post-Dredge Hydrographic Survey	February 22, 2016	February 22, 2016
Dredge Return Water Treatment		
Dredge Return Water Treatment and Discharge	September 21, 2015	February 22, 2015
Slope Stabilization Measures		
Temporary Slope Stabilization Measures Implemented in front of Substation	September 22, 2015	November 9, 2015
Concrete Test Pile Program		
Dredge Test Pits around Test Pile Locations	December 2, 2015	December 2, 2015
Test Piles Installed	December 7, 2015	December 10, 2015
Perform Testing	December 10, 2015	December 14, 2015
Extract Test Piles	December 14, 2015	December 15, 2015
Contaminated Sediment Disposal		
Off-Site Disposal to LRI	September 21, 2015	February 26, 2015
Sediment Sampling		
Post-Dredge Confirmational Sampling—First Event	January 4, 2016	January 5, 2016
Post-Dredge Confirmational Sampling—Second Event	January 29, 2016	January 30, 2016
Post-Dredge Confirmational Sampling—Final Event	February 9, 2016	February 9, 2016
Demobilization		
Transload Site and Pier 4 Demobilization	February 22, 2016	March 30, 2016
Final OSC Inspection and Notice of Completion	March 30, 2016	April 1, 2016

Table 7.1
Summary of Post-Dredge Confirmational and Perimeter Sample Analytical Results

					Tributyltin Bulk Sediment	Tributyltin Porewater	Total Organic Carbon
DMMP Screening Level					73	0.15	--
Project Action Level					219	--	--
Area	Sampling Event	Sample ID	Sample Date	Depth	µg/kg	µg/L	%
Post-Dredge Confirmational Samples							
DMU-1	1 st	DMU1-0-10	1/4/2016	0–10 cm	36	0.029	0.503
		DMU1-10-20	1/4/2016	10–20 cm	7.9 J	NA	NA
		DMU1-0-1'	1/4/2016	0–1 ft	16	NA	NA
DMU-2	1 st	DMU2-0-10	1/4/2016	0–10 cm	8.9	0.15	0.315
		DMU2-10-20	1/4/2016	10–20 cm	2.6 U	NA	NA
DMU-3	1 st	DMU3-0-10	1/4/2016	0–10 cm	120	0.56	NA
		DMU3-10-20	1/4/2016	10–20 cm	320	NA	NA
		DMU3-0-1'	1/4/2016	0–1 ft	44 J	NA	0.689
	2 nd	DMU3-10cm-2'	1/29/2016	10 cm–2 ft	3.4 U	NA	NA
		DMU3-2-4	1/29/2016	2–4 ft	3.5 U	NA	NA
	Final	DMU3-0-10	2/9/2016	0–10 cm	NA	0.24 ¹	NA
DMU-4	1 st	DMU4-0-10	1/4/2016	0–10 cm	33	0.64	0.534
		DMU4-10-20	1/4/2016	10–20 cm	42	0.32	0.384
	2 nd	DMU4-0-10	1/30/2016	0–10 cm	NA	0.23	NA
		DMU104-0-10 ²	1/30/2016	0–10 cm	NA	0.43	NA
		DMU4-10cm-2'	1/29/2016	10 cm–2 ft	3.3 JQ	NA	NA
		DMU4-2-4	1/29/2016	2–4 ft	3.4 U	NA	NA
	Final	DMU4-0-10	2/9/2016	0–10 cm	NA	0.19 ¹	NA
		DMU104-0-10 ³	2/9/2016	0–10 cm	NA	0.16 ¹	NA
DMU-5	1 st	DMU5-0-10	1/4/2016	0–10 cm	1.1 JQ	NA	0.132
		DMU5-10-20	1/4/2016	10–20 cm	2.6 U	NA	NA
DMU-6	1 st	DMU6-0-10	1/4/2016	0–10 cm	120	0.56	0.63
		DMU6-10-20	1/4/2016	10–20 cm	61	2.2	0.33
	2 nd	DMU6-0-10	1/30/2016	0–10 cm	NA	1.4	NA
		DMU6-10cm-2	1/30/2016	10 cm–2 ft	3.8 U	NA	NA
			DMU6-2-4	1/30/2016	2–4 ft	3.8 U	NA
Final	DMU6-0-10	2/9/2016	0–10 cm	NA	0.61 ¹	NA	
DMU-7	1 st	DMU7-0-10	1/4/2016	0–10 cm	41	0.63	0.241
		DMU7-10-20	1/4/2016	10–20 cm	24	NA	NA
	2 nd	DMU7-10cm-2'	1/30/2016	10 cm–2 ft	3.4 U	NA	NA
		DMU7-2-4	1/30/2016	2–4 ft	3.8 U	NA	NA
	Final	DMU7-0-10	2/9/2016	0–10 cm	NA	0.24 ¹	NA
DMU-8	1 st	DMU8-0-10	1/4/2016	0–10 cm	39	0.29	0.442
		DMU8-10-20	1/4/2016	10–20 cm	27	NA	NA
	2 nd	DMU8-10cm-2'	1/29/2016	10 cm–2 ft	5.2	NA	NA
		DMU8-2-4	1/29/2016	2–4 ft	3.5 U	NA	NA
	Final	DMU8-0-10	2/9/2016	0–10 cm	NA	0.35 ¹	NA
DMU-9	1 st	DMU-43:619	1/4/2016	0–10 cm	16	0.14	0.763
		DMU9-10-20	1/4/2016	10–20 cm	2.1 JQ	NA	NA
DMU-10	1 st	DMU10-0-10	1/4/2016	0–10 cm	1.8 JQ	NA	0.29
		DMU10-10-20	1/4/2016	10–20 cm	4.0	NA	0.122
DMU-11	1 st	DMU11-0-10	1/5/2016	0–10 cm	3.7 U	0.0060 UJ	0.229
		DMU11-10-20	1/5/2016	10–20 cm	3.6 U	NA	NA
DMU-12	1 st	DMU12-0-10	1/5/2016	0–10 cm	2.9 JQ	NA	0.062
		DMU12-10-20	1/5/2016	10–20 cm	3.4 U	NA	NA
DMU-13	1 st	DMU13-0-10	1/5/2016	0–10 cm	3.7 U	NA	0.098
		DMU13-10-20	1/5/2016	10–20 cm	3.7 U	NA	NA
DMU-14	1 st	DMU14-0-10	1/5/2016	0–10 cm	3.6 U	NA	0.044
		DMU14-10-20	1/5/2016	10–20 cm	3.8 U	NA	NA
DMU-15	1 st	DMU15-0-10	1/5/2016	0–10 cm	3.6 U	NA	0.063
		DMU15-10-20	1/5/2016	10–20 cm	3.4 U	NA	NA
		DMU15-10-20-D	1/5/2016	10–20 cm	3.4 U	NA	NA
DMU-16	1 st	DMU16-0-10	1/5/2016	0–10 cm	3.4 U	NA	0.052
		DMU16-10-20	1/5/2016	10–20 cm	3.4 U	NA	NA
DMU-17	1 st	DMU17-0-10	1/5/2016	0–10 cm	3.6 U	NA	0.054
		DMU17-10-20	1/5/2016	10–20 cm	3.5 U	NA	NA
Perimeter Samples ⁴							
PR-01	1 st	PR1-0-10	1/5/2016	0–10 cm	4.2	NA	NA
PR-02	1 st	PR2-0-10	1/5/2016	0–10 cm	4.0	NA	NA
PR-03	1 st	PR3-0-10	1/5/2016	0–10 cm	7.7	NA	NA
PR-04	1 st	PR4-0-10	1/5/2016	0–10 cm	49	NA	NA
PR-05	1 st	PR5-0-10	1/5/2016	0–10 cm	18	NA	NA
PR-06	1 st	PR6-0-10	1/5/2016	0–10 cm	70	NA	NA
PR-07	1 st	PR7-0-10	1/5/2016	0–10 cm	33	NA	NA
PR-08	1 st	PR8-0-10	1/5/2016	0–10 cm	44	NA	NA
PR-09	1 st	PR9-0-10	1/5/2016	0–10 cm	52	NA	NA

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Table 7.1

Summary of Post-Dredge Confirmational
and Perimeter Sample Analytical Results

Table 7.1
Summary of Post-Dredge Confirmational and Perimeter Sample Analytical Results

					Tributyltin Bulk Sediment	Tributyltin Porewater	Total Organic Carbon
DMMP Screening Level					73	0.15	--
Project Action Level					219	--	--
Area	Sampling Event	Sample ID	Sample Date	Depth	µg/kg	µg/L	%
Perimeter Samples (Cont.)⁴							
PR-10	1 st	PR10-0-10	1/5/2016	0–10 cm	130	NA	NA
PR-11	1 st	PR11-0-10	1/5/2016	0–10 cm	170	NA	NA
PR-12	1 st	PR12-0-10	1/5/2016	0–10 cm	160	NA	NA
PR-13	1 st	PR13-0-10	1/5/2016	0–10 cm	62	NA	NA
PR-14	1 st	PR14-0-10	1/4/2016	0–10 cm	46	NA	NA
PR-15	1 st	PR15-0-10	1/4/2016	0–10 cm	7	0.16	0.527
PR-16	1 st	PR16-0-10	1/4/2016	0–10 cm	97	1.4	0.57
PR-17	1 st	PR17-0-10	1/4/2016	0–10 cm	120	1.7	0.392
PR-18	1 st	PR18-0-10	1/4/2016	0–10 cm	93	0.32	0.245
PR-19	1 st	PR19-0-10	1/5/2016	0–10 cm	160	NA	NA
PR-20	1 st	PR20-0-10	1/4/2016	0–10 cm	5.5	NA	NA
PR-21	1 st	PR21-0-10	1/4/2016	0–10 cm	22	0.31	0.371
		PR21-0-10-D	1/4/2016	0–10 cm	25	0.23	0.315
PR-22	1 st	PR22-0-10	1/4/2016	0–10 cm	14	NA	NA
		PR22-0-10-D	1/4/2016	0–10 cm	13	NA	NA
PR-23	1 st	PR23-0-10	1/4/2016	0–10 cm	67	NA	NA
PR-24	1 st	PR24-0-10	1/5/2016	0–10 cm	21	NA	NA
PR-25	1 st	PR25-0-10	1/5/2016	0–10 cm	23	NA	NA
PR-26	1 st	PR26-0-10	1/5/2016	0–10 cm	77	NA	NA
OF-1 ⁵	1 st	OF-1-0-10	1/5/2016	0–10 cm	4.2	NA	NA

Notes:

-- Not applicable.

BOLD Concentration exceeds the DMMP Screening Level.**ITALIC** Concentration exceeds the DMMP Screening Level and Project Action Level.

1 Although the surface 0- to 10-cm porewater result exceeds the DMMP Screening Level of 0.15 µg/L, the subsurface bulk TBT result was less than the DMMP Screening Level of 73 µg/kg; therefore, an additional dredge pass was conducted and no additional sampling was performed or required.

2 For the second sampling event, sample DMU104-0-10 was a field duplicate of sample DMU4-0-10.

3 For the final sampling event, sample DMU104-0-10 was a field duplicate of sample DMU4-0-10.

4 Due to exceedances of bulk TBT concentrations in some perimeter grid cells and a lack of porewater data in any of the perimeter grid cells, as required by the USEPA/DMMP, all the perimeter grid cells were dredged 1 to 2 feet and no additional samples were collected or required.

5 The surface sediment sample was collected approximately 12 feet off the APM Terminal outfall associated with the dredged material water treatment system, as required by USEPA.

Abbreviations:

cm Centimeters

DMMP Dredged Material Management Program

ft Feet

µg/kg Micrograms per kilogram

µg/L Micrograms per liter

NA Sample for respective analysis not collected or analyzed.

TBT Tributyltin

USEPA U.S. Environmental Protection Agency

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.

JQ Analyte was detected between the reporting limit and method detection limit, concentration is considered to be an estimate.

U Analyte was not detected, concentration given is the reporting limit.

UJ Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate. Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate. Analyte was not detected, concentration given is the reporting limit, which is considered to be an estimate.

Table 8.1
Summary of Waste, Recycling, and Disposal

	Concrete (tons recycled)	Deck Ballast (tons disposed)	Creosote (tons disposed)	Metal (tons recycled)	Asphalt (tons recycled)	Clean Sediment (CY to open water disposal)	Sediment (tons disposed)
Previous Quantities Reported in July Monthly Report	7,218	1,746	21	592	0	--	--
Location (Date Range)	Lloyds (June 30)	PCRCD (May 21–May 26)	Roosevelt Landfill (May 9)	Schnitzer Steel Industries/Simon Metals (May 14–June 14/June 8–June 19)	--	--	--
Previous Quantities Reported in August Monthly Report	8,536	0	178	775	0	--	481
Location (Date Range)	Lloyds (August 4)	--	Roosevelt Landfill (June 8–June 19)	Simon Metals (June 23–July 29)	--	--	PCRCD (July 23–31)
Previous Quantities Reported in September Monthly Report	14,985	0	19	354	3,885	6,550	0
Location (Date Range)	Lloyds (September 19)	--	Roosevelt Landfill (August 27)	Schnitzer Steel Industries/Simon Metals/Tacoma Metals (August 4–September 18/ July 30–September 2/August 19–20)	Rhine Yard	Commencement Bay Non-Dispersive Disposal Site	--
Previous Quantities Reported in October Monthly Report	1,505	0	0	77	0	0	7,897
Location (Date Range)	Lloyds (September 23)	--	--	Schnitzer Steel Industries (September 21–24)	--	--	LRI (September 16–30)
Previous Quantities Reported in November Monthly Report	0	0	0	0	0	0	27,506
Location (Date Range)	--	--	--	--	--	--	LRI (October 1–30)
Previous Quantities Reported in December Monthly Report	0	0	0	0	0	0	23,951
Location (Date Range)	--	--	--	--	--	--	LRI (November 2–30)
Previous Quantities Reported for January Monthly Report	0	0	0	0	0	0	25,366
Location (Date Range)	--	--	--	--	--	--	LRI (December 1–31)
Previous Quantities Reported for February Monthly Report	0	0	0	0	0	0	8,739
Location (Date Range)	--	--	--	--	--	--	LRI (January 4–29)
Current Quantities Reported for March Monthly Report	0	0	0	0	0	0	15,500
Location (Date Range)	--	--	--	--	--	--	LRI (February 1–26)
Totals as of 3/22/16	32,244	1,746	218	1,798	3,885	6,550	109,440
Total Debris Removed from Site ¹	155,881 tons						
Total Debris Disposed of at Landfill ²	111,404 tons						
Total Debris Diverted from Landfill (Recycled) ³	37,927 tons						
Approx. Percentage of Debris Diverted from Landfill	24						

Notes:

-- Not applicable.

1 Total debris removed from site is the sum of the material recycled and disposed of at a landfill.

2 Total debris at the landfill consists of deck ballast, creosote, and contaminated sediment.

3 Total recycled material consists of concrete, metal, and asphalt.

Abbreviations:

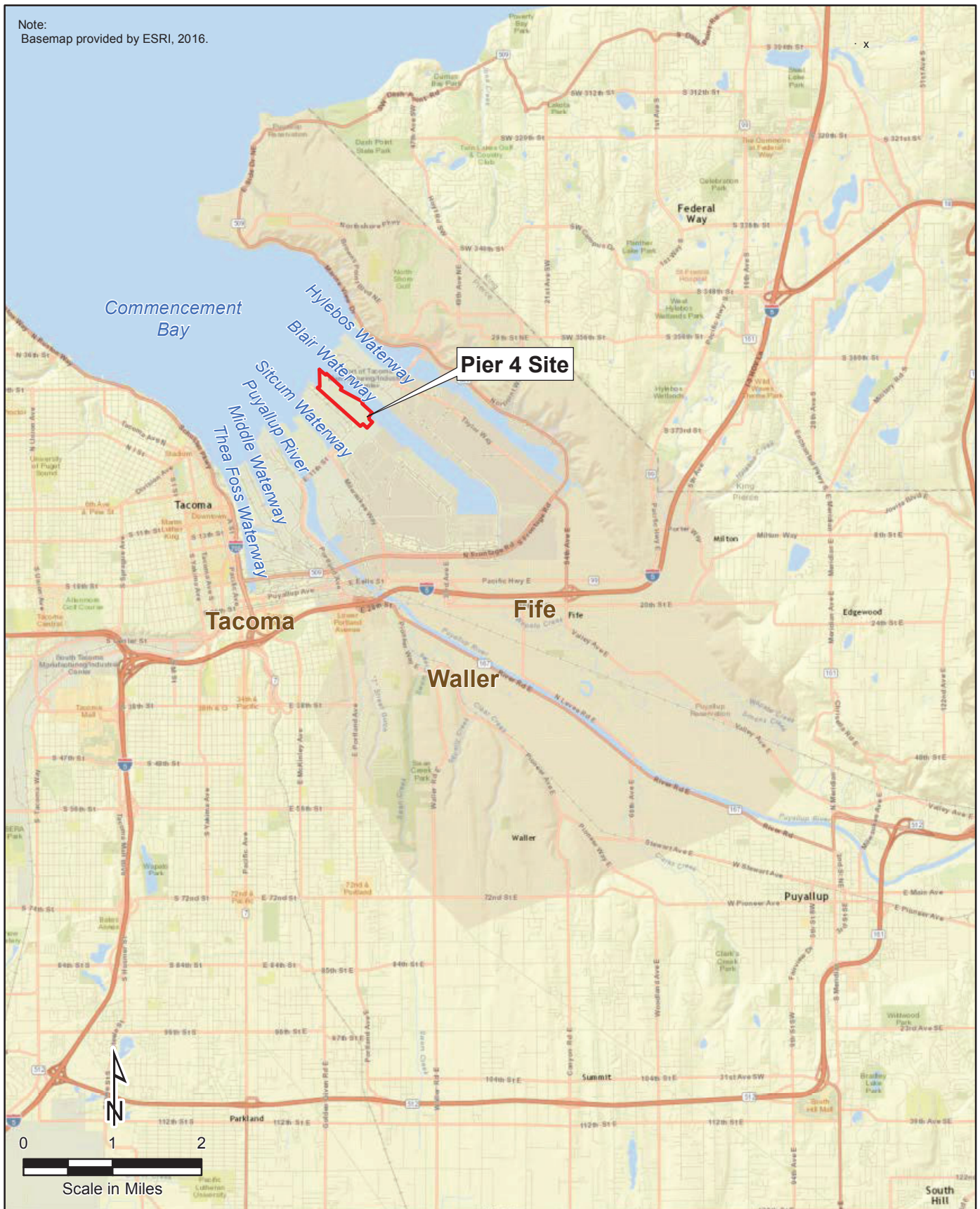
CY Cubic yard

PCRCD Pierce County Recycling , Composting, and Disposal

Pier 4
Phase 1 Removal Action
Time Critical Removal
Action Completion Report

Figures

Note:
Basemap provided by ESRI, 2016.

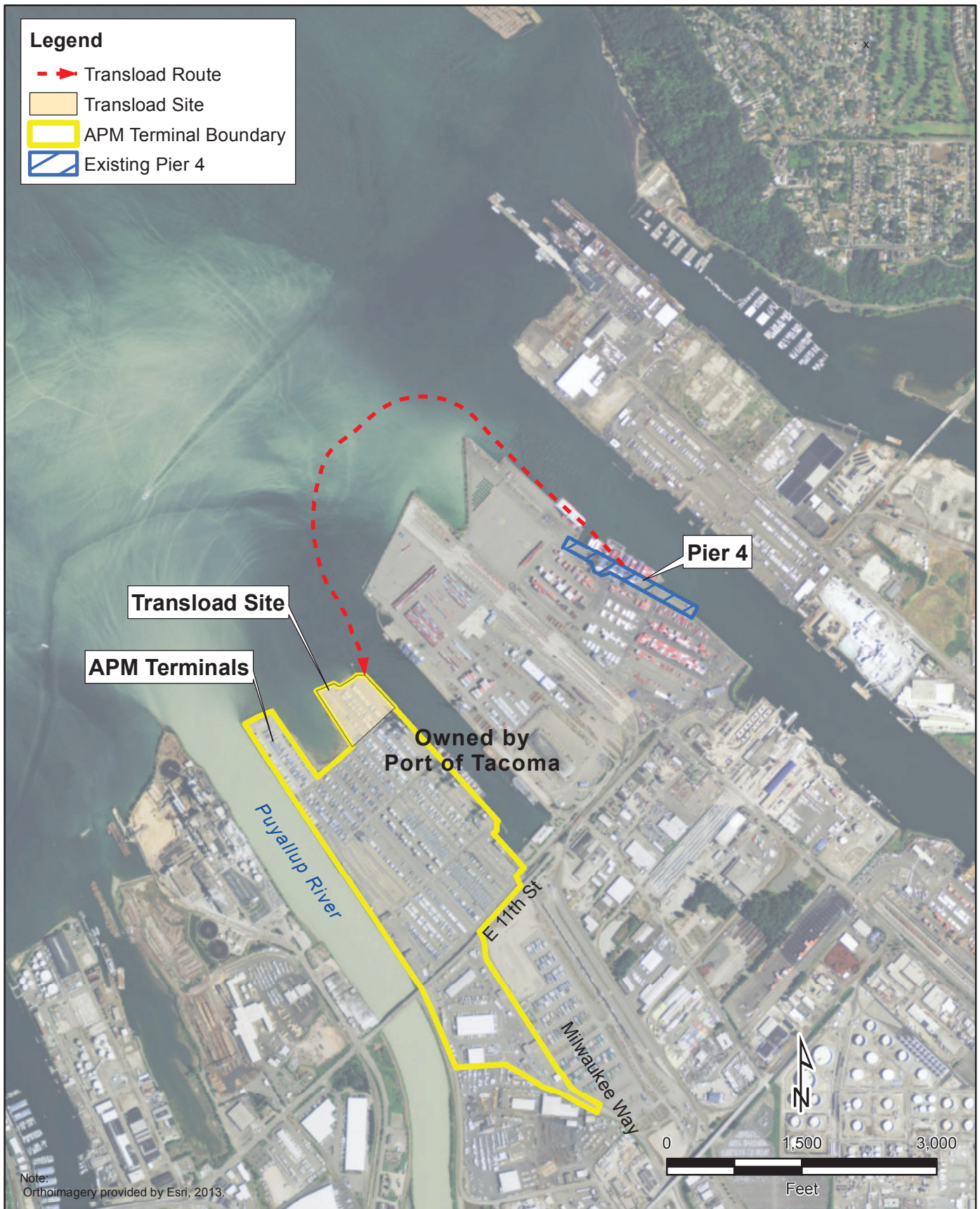


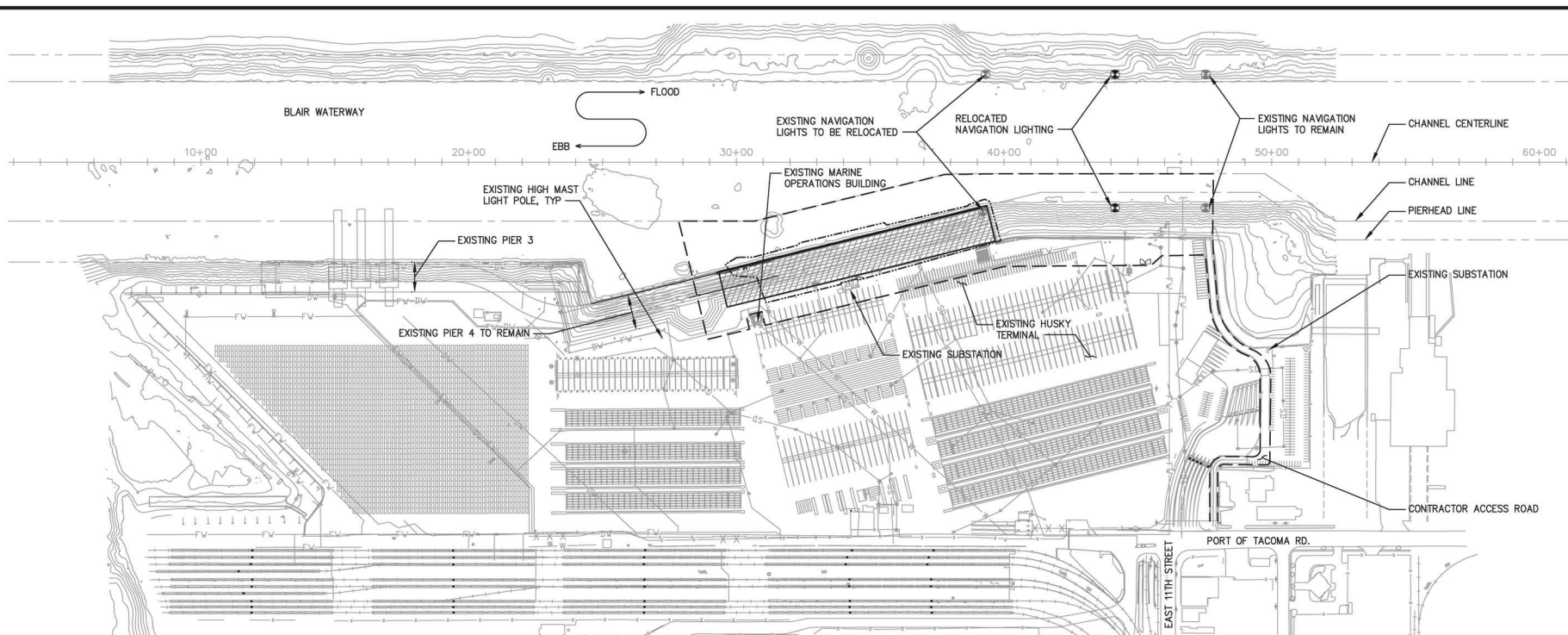


FLOYD | SNIDER
 strategy • science • engineering

**Time Critical Removal Action Completion Report
 Pier 4 Phase 1 Removal Action Project
 Tacoma, Washington**

Figure 1.2
 Site Location Map





OVERALL SITE PLAN

SCALE: 1"=200'

NOTES

1. THIS PLAN PROVIDES AN OVERVIEW OF THE PROJECT ELEMENTS AND DOES NOT COMPLETELY DESCRIBE THE PROJECT. SEE COMPLETE CONTRACT DOCUMENTS FOR ALL CONTRACT AND PROJECT REQUIREMENTS.

LEGEND

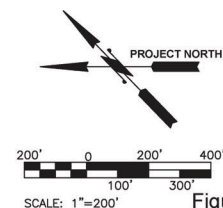
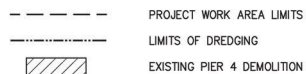
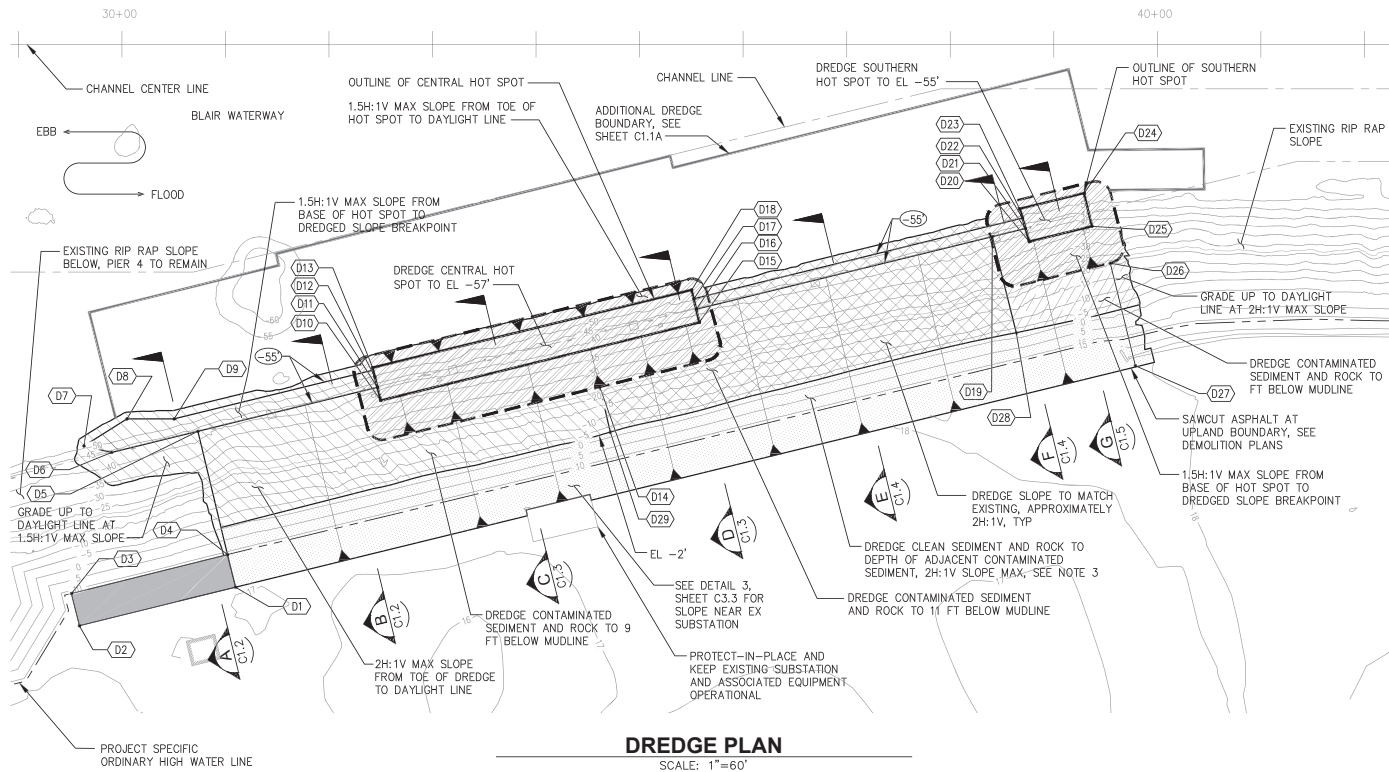


Figure 2.2
Overall Site Plan

G5.1 SH 6 OF 57	PIER 4 PHASE 1 REMOVAL ACTION PROJECT OVERALL SITE PLAN		APPROVED:				RECORD DRAWINGS: THESE RECORD DRAWINGS HAVE BEEN PREPARED FROM INFORMATION PROVIDED BY THE CLIENT. THE CLIENT HAS VERIFIED THE ACCURACY AND/OR COMPLETENESS OF THIS INFORMATION		kpff 2407 North 1st Street, Suite 100 Tacoma, WA 98401 (253) 394-0150 Fax (253) 396-6162 www.kpff.com	Port of Tacoma 1000 COMMERCIAL AVENUE TACOMA, WA 98401
	CONTRACT: 065982 M. ID: 091452 DATE: 09/14/52	TOWNSHIP: 21N RANGE: 3E SECTION: 27 M.I.W. 19.39' @ Tide 22 19.33 DAT-HRZ: WA83--5F VERT:	DIRECTOR ENG. DATE: PROL. ENGR. DATE PRINTED BY: elements art, 2016 PORT ADDRESS: ONE SITCOM PLAZA TACOMA, WA 98401-1837	SWK 2/6/2015 CHK 2/6/2015 MOK	MARKS: REVISION:	BY:	DATE:			



DREDGE CONTROL POINTS		
POINT ID	NORTHING	EASTING
D1	713152.79	1166642.74
D2	713231.01	1166508.54
D3	713258.70	1166524.68
D4	713180.77	1166659.10
D5	713286.19	1166721.50
D6	713329.49	1166647.52
D7	713352.58	1166632.50
D8	713342.43	1166680.58
D9	713310.77	1166713.24
D10	713184.68	1166868.96
D11	713196.01	1166875.57
D12	713204.74	1166880.67
D13	713212.91	1166885.44
D14	713046.76	1167030.02
D15	713024.62	1167142.41
D16	713035.80	1167149.30
D17	713044.72	1167154.55

DREDGE CONTROL POINTS CONT'D		
POINT ID	NORTHING	EASTING
D18	713052.29	1167158.97
D19	712887.18	1167403.23
D20	712858.93	1167425.58
D21	712870.47	1167431.77
D22	712879.75	1167436.74
D23	712887.99	1167440.82
D24	712855.44	1167496.05
D25	712827.39	1167479.42
D26	712789.44	1167467.20
D27	712701.52	1167415.72
D28	712804.42	1167355.30
D29	713008.45	1167006.95

NOTES

- DREDGING SHALL NOT EXTEND BEYOND LIMITS SHOWN.
- CONTRACTOR SHALL COORDINATE ALL DREDGING ACTIVITIES AND SCHEDULE WITH THE PORT AND EXISTING TERMINAL OPERATORS.
- IN CLEAN MATERIAL DREDGE AREA REMOVE CLEAN RIP RAP FROM SLOPE PRIOR TO DREDGING SEDIMENT. TRANSPORT RIP RAP TO UPLANDS FOR DISPOSAL OR REUSE.
- ALL CLEAN SEDIMENT (NOT INCLUDING RIP RAP) SHALL BE DISPOSED OF AT THE COMMENCEMENT BAY OPEN WATER DISPOSAL SITE AND IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS. REFER TO SPECIFICATIONS FOR HANDLING, PROTECTIVE MEASURES. FOR DISPOSAL SITE LOCATION SEE C1.5
- ALL CONTAMINATED SEDIMENT AND ROCK SHALL BE TRANSPORTED TO AND TREATED AT THE TRANSLOAD FACILITY IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS. REFER TO TRANSLOAD FACILITY PLAN AND THE SPECIFICATIONS FOR HANDLING, PROTECTIVE MEASURES, TREATMENT Dewatering AND DISPOSAL REQUIREMENTS.
- A MULTI-PASS APPROACH SHALL BE USED FOR DREDGING OF CONTAMINATED MATERIALS. AN ADDITIONAL DREDGE PASS IS REQUIRED FOR DREDGING WITHIN THE OUTLINE OF THE HOT SPOTS. SEE SPECIFICATIONS.
- SAWCUT AND DEMOLISH ASPHALT AND EXCAVATE (MINIMUM 2H:1V SLOPE) AS REQUIRED TO DEMOLISH THE EXISTING BULKHEAD.
- SEE SPECIFICATIONS FOR ADDITIONAL DREDGING AND DISPOSAL REQUIREMENTS.

LEGEND

- EXISTING CONTOUR
- TOE OF DREDGE
- DREDGE CONTROL POINTS
- DREDGE SLOPE
- INDICATES EXTENT OF CONTAMINATED SEDIMENT DREDGING, DREDGE CONTAMINATED SEDIMENT AND RIP RAP TO 9FT BELOW MUDLINE, SEE NOTE 5
- INDICATES EXTENT OF CONTAMINATED SEDIMENT DREDGING, DREDGE CONTAMINATED SEDIMENT AND RIP RAP TO 11FT BELOW MUDLINE, SEE NOTE 5
- INDICATES EXTENT OF CONTAMINATED SEDIMENT DREDGING, DREDGE CONTAMINATED SEDIMENT AND RIP RAP TO 8FT BELOW MUDLINE, SEE NOTE 5
- INDICATES EXTENT OF CLEAN SEDIMENT DREDGING, DREDGE CLEAN SEDIMENT AND RIP RAP TO SAME DREDGE DEPTH AS ADJACENT CONTAMINATED SEDIMENT AND RIP RAP. DEPTH VARIES 8 FT TO 11 FT, SEE NOTES 3 AND 4
- INDICATES EXTENT OF CONTAMINATED HOT SPOT DREDGING, DREDGE DEPTH AND SIZE INDICATED IN PLAN AND SECTION. DREDGING WITHIN THIS AREA SHALL OCCUR WITHIN THE CONFINES OF A PARTIAL DEPTH IMPERMEABLE SILT CURTAIN. SEE SPECIFICATIONS.
- EXCAVATION, SEE NOTE 7
- PROJECT SPECIFIC OHWL (+12.78)
- APPROXIMATE OUTLINE OF DREDGED SLOPE BREAKPOINT FOR HOT SPOT DREDGING
- ADDITIONAL DREDGE BOUNDARY, SEE SHEET C1.1A

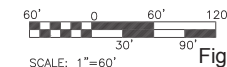
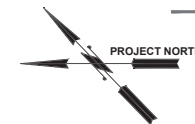
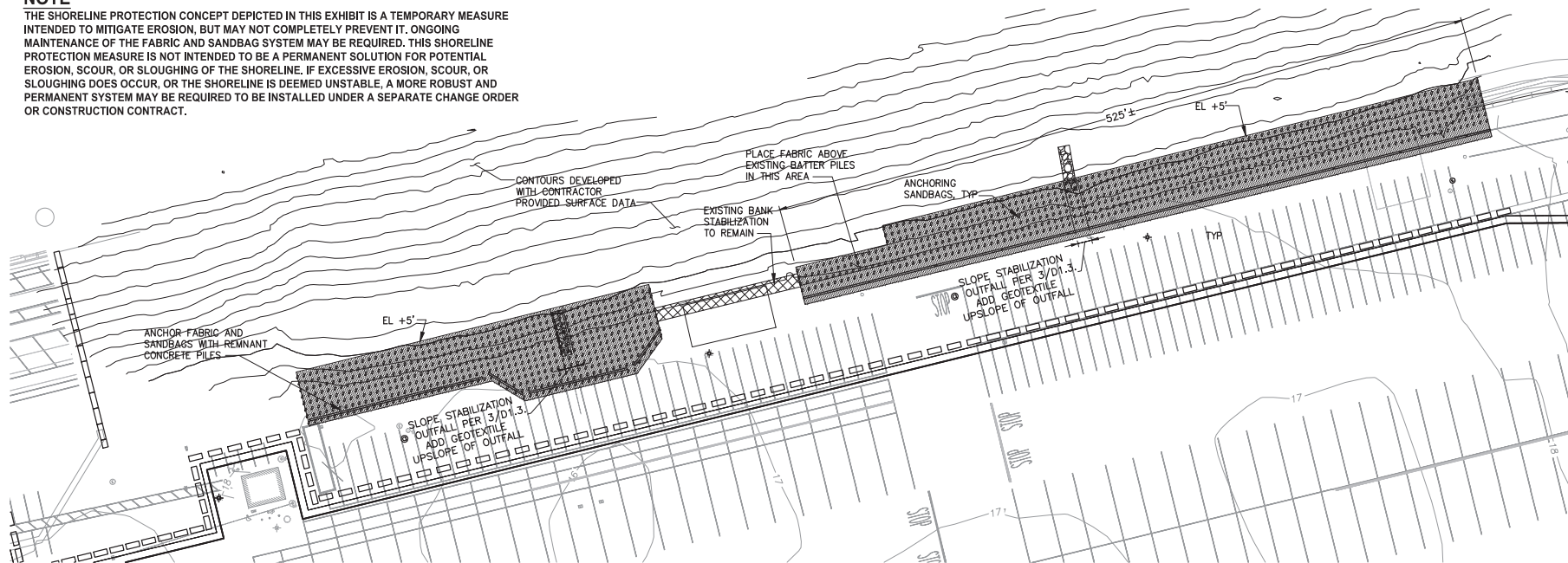


Figure 2.3
Dredge Plan

		DATE: _____	
		BY: _____	
RECORD DRAWINGS:		MARK: _____	
THESE RECORD DRAWINGS ARE THE PROPERTY OF THE PORT OF TACOMA AND SHALL NOT BE USED ON OTHER WORK, DISCLOSED, COPIED, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION.		REVISION: _____	
SWK: 2/6/2015		CHECKED BY: DATE: _____	
MDK: 2/6/2015		PROJ. ENGR. DATE: _____	
DIRECTOR: ENG. DATE: _____		TITLUM: Apr 01, 2016	
PRINTED BY: _____		PORT ADDRESS: ONE SITUUM PLAZA	
TACOMA, WA 98401-1837		DRAWING SCALE: AS NOTED	
PIER 4 PHASE 1		REMOVAL ACTION PROJECT	
DREDGE PLAN		DREDGE PLAN	
CONT./CONS: 069982		TOWNSHIP: 21N RANGE: 3E SECTION: 27	
M. ID: 091452		MLW 19.39' @ Tide 22 1933	
PHASE: RECORD DRAWINGS		DAT-HRZ: WA83-SF VERT: _____	
		PARCEL: _____	

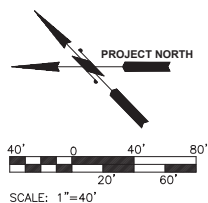
NOTE

THE SHORELINE PROTECTION CONCEPT DEPICTED IN THIS EXHIBIT IS A TEMPORARY MEASURE INTENDED TO MITIGATE EROSION, BUT MAY NOT COMPLETELY PREVENT IT. ONGOING MAINTENANCE OF THE FABRIC AND SANDBAG SYSTEM MAY BE REQUIRED. THIS SHORELINE PROTECTION MEASURE IS NOT INTENDED TO BE A PERMANENT SOLUTION FOR POTENTIAL EROSION, SCOUR, OR SLOUGHING OF THE SHORELINE. IF EXCESSIVE EROSION, SCOUR, OR SLOUGHING DOES OCCUR, OR THE SHORELINE IS DEEMED UNSTABLE, A MORE ROBUST AND PERMANENT SYSTEM MAY BE REQUIRED TO BE INSTALLED UNDER A SEPARATE CHANGE ORDER OR CONSTRUCTION CONTRACT.

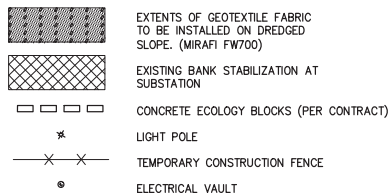


SHORELINE PROTECTION PLAN

SCALE: 1"=40'



LEGEND



NOTES

1. CUT DOWN EXISTING TIMBER PILE STUBS AND REMOVE SHARP DEBRIS PRIOR TO PLACING GEOTEXTILE.
2. ROLLS OF GEOTEXTILE MATERIAL SHALL BE AS WIDE AS PRACTICAL TO REDUCE THE NUMBER OF OVERLAPPING JOINTS.
3. ADJACENT ROLLS SHALL BE OVERLAPPED ALONG THEIR SIDES BY 24 INCHES. FABRIC SHALL BE PLACED TIGHT TO THE SLOPE AND SECURELY ANCHORED AT THE TOP, BOTTOM, EDGES, AND ALONG SEAMS, AS SHOWN.
4. MATERIAL USED TO FILL SANDBAGS SHALL BE WASHED PEA-GRAVEL.
5. PROCURE 150 ADDITIONAL SANDBAGS FOR ONGOING MAINTENANCE OF SHORELINE PROTECTION MEASURE. MAINTENANCE TO BE PERFORMED BY THE PORT. STOCK PILE EXTRA SANDBAGS AT A LOCATION APPROVED BY THE PORT.

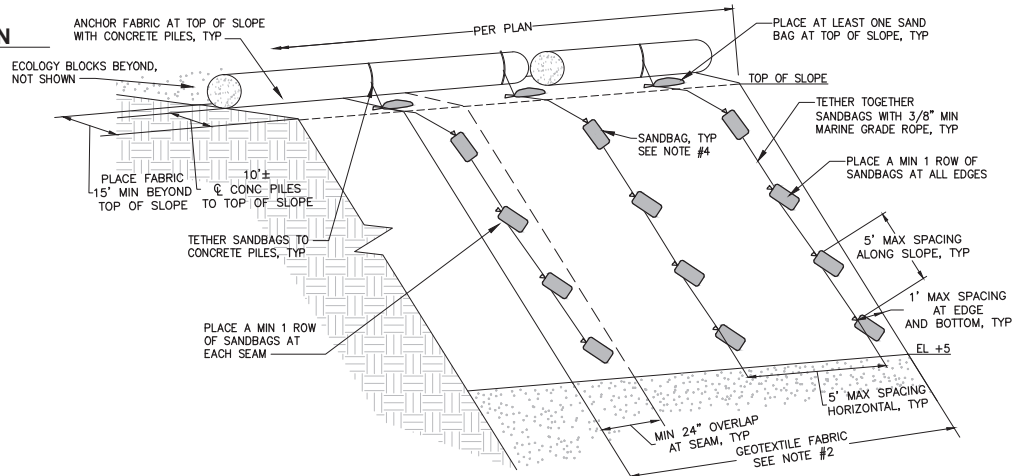


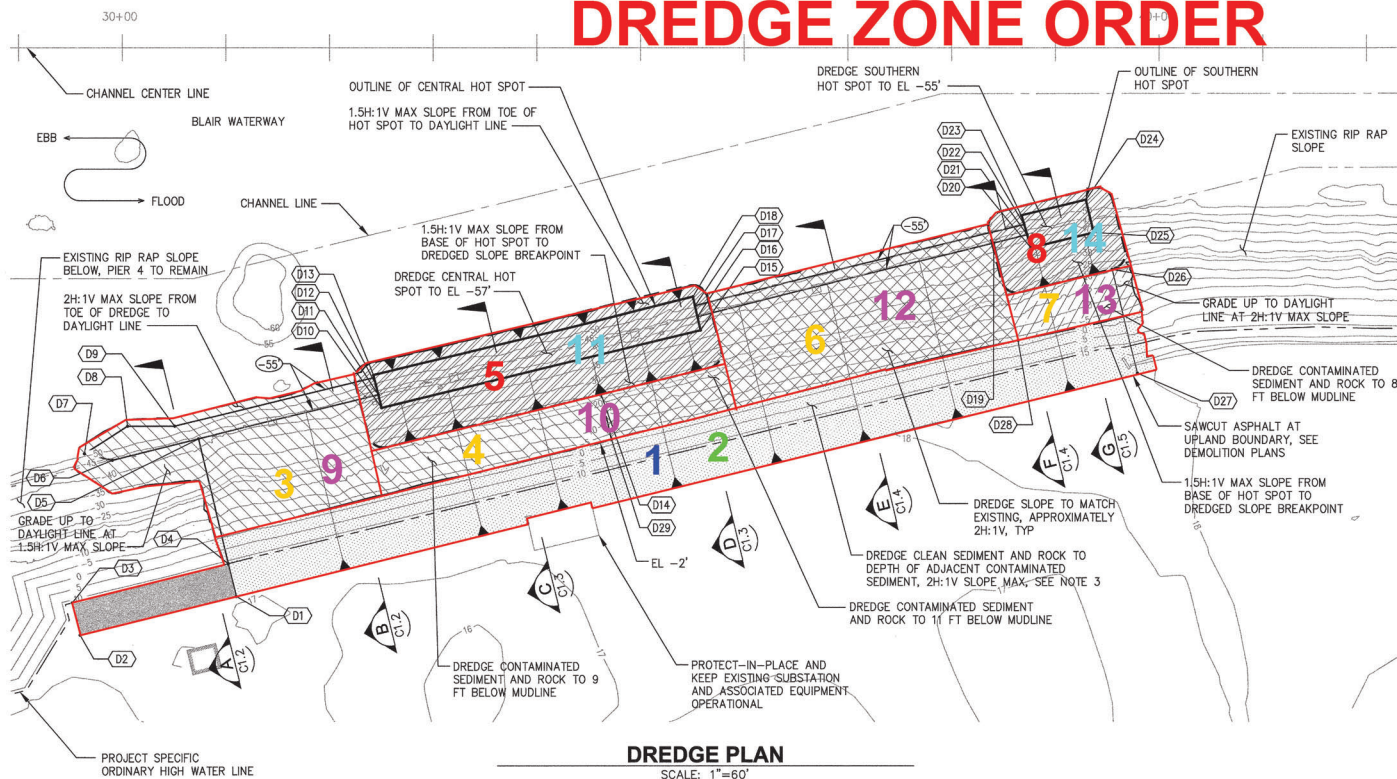
Figure 5.1
Temporary Slope
Stabilization Measures

SHORELINE PROTECTION ISOMETRIC

SCALE: NTS

<div><div>C3.4</div><div>SALES OF LOT 87</div><div>CONTRACT NO. 094982</div><div>M.D. ID: 091452</div></div>	PIER 4 PHASE 1										RECORD DRAWINGS:									
	REMOVAL ACTION PROJECT										THESE RECORD DRAWINGS									
	SHORELINE PROTECTION PLAN										HAVE BEEN PREPARED FROM									
											INFORMATION PROVIDED BY									
											THESE OFFICES FOR THE									
											ACCURACY									
											AND/OR COMPLESS OF									
											THIS INFORMATION									

DREDGE ZONE ORDER



DREDGE CONTROL POINTS		
POINT ID	NORTHING	EASTING
D1	713152.79	116642.74
D2	713231.01	1166508.54
D3	713258.70	1166524.68
D4	713180.77	1166559.10
D5	713286.19	1166721.50
D6	713329.49	1166647.52
D7	713352.58	1166632.50
D8	713342.43	1166680.58
D9	713310.77	1166713.24
D10	713184.68	1166868.96
D11	713196.01	1166875.57
D12	713204.74	1166880.67
D13	713212.91	1166885.44
D14	713046.76	1167030.02
D15	713024.62	1167142.41
D16	713035.80	1167149.30
D17	713044.72	1167154.55

DREDGE CONTROL POINTS CONT'D		
POINT ID	NORTHING	EASTING
D18	713052.29	1167158.97
D19	712887.18	1167403.23
D20	712858.93	1167425.58
D21	712870.47	1167431.77
D22	712879.75	1167436.74
D23	712887.99	1167440.82
D24	712855.44	1167496.05
D25	712827.39	1167479.42
D26	712789.44	1167467.20
D27	712701.52	1167415.72
D28	712804.42	1167355.30
D29	713008.45	1167006.95

DREDGE SEQUENCE

ZONE 1: Clean Riprap Removal

ZONE 2: Clean Sediment Dredging

ZONE(S) 3,4,6,7: Contaminated Material Dredging First Passes

ZONE(S) 5,8: Contaminated Hot Spot Dredging First Passes

ZONE(S) 9,10,12,13: Contaminated Material Dredging Final Pass

ZONE(S) 11,14: Contaminated Hot Spot Dredging Final Pass

NOTES

- DREDGING SHALL NOT EXTEND BEYOND LIMITS SHOWN.
- CONTRACTOR SHALL COORDINATE ALL DREDGING ACTIVITIES AND SCHEDULE WITH THE PORT AND EXISTING TERMINAL OPERATORS.
- IN CLEAN MATERIAL DREDGE AREA REMOVE CLEAN RIP RAP FROM SLOPE PRIOR TO DREDGING SEDIMENT. TRANSPORT RIP RAP TO UPLANDS FOR DISPOSAL OR REUSE.
- ALL CLEAN SEDIMENT (NOT INCLUDING RIP RAP) SHALL BE DISPOSED OF AT THE COMMENCEMENT BAY OPEN WATER DISPOSAL SITE AND IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS. REFER TO SPECIFICATIONS FOR HANDLING, PROTECTIVE MEASURES, FOR DISPOSAL SITE LOCATION SEE C1.5
- A MULTI-PASS APPROACH SHALL BE USED FOR DREDGING OF CONTAMINATED MATERIALS. AN ADDITIONAL DREDGE PASS IS REQUIRED FOR DREDGING WITHIN THE OUTLINE OF THE HOT SPOTS. SEE SPECIFICATIONS.
- SAWCUT AND DEMOLISH ASPHALT AND EXCAVATE (MINIMUM 2H:1V SLOPE) AS REQUIRED TO DEMOLISH THE EXISTING BULKHEAD.
- SEE SPECIFICATIONS FOR ADDITIONAL DREDGING AND DISPOSAL REQUIREMENTS.

LEGEND

- EXISTING CONTOUR
- TOE OF DREDGE
- DREDGE CONTROL POINTS
- DREDGE SLOPE
- INDICATES EXTENT OF CONTAMINATED SEDIMENT DREDGING, DREDGE CONTAMINATED SEDIMENT AND RIP RAP TO 9 FT BELOW MUDLINE, SEE NOTE 5
- INDICATES EXTENT OF CONTAMINATED SEDIMENT DREDGING, DREDGE CONTAMINATED SEDIMENT AND RIP RAP TO 11 FT BELOW MUDLINE, SEE NOTE 5
- INDICATES EXTENT OF CONTAMINATED SEDIMENT DREDGING, DREDGE CONTAMINATED SEDIMENT AND RIP RAP TO 11 FT, SEE NOTES 3 AND 4
- INDICATES EXTENT OF CONTAMINATED HOT SPOT DREDGING, DREDGE DEPTH AND SIZE INDICATED IN PLAN AND SECTION. DREDGING WITHIN THIS AREA SHALL OCCUR WITHIN THE CONFINES OF A PARTIAL DEPTH IMPERMEABLE SILT CURTAIN. SEE SPECIFICATIONS.
- EXCAVATION, SEE NOTE 7
- PROJECT SPECIFIC OHWL (+12.78)
- APPROXIMATE OUTLINE OF DREDGED SLOPE BREAKPOINT FOR HOT SPOT DREDGING

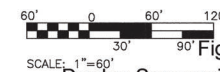
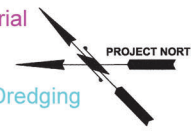


Figure 5.2
Dredge Sequencing Plan

Port of Tacoma
1000 1st Avenue, Suite 100
Tacoma, Washington 98401
(253) 396-6100 Fax (253) 396-6162

APPROVED: *[Signature]* DATE: 2/6/2015

CHECKED BY: *[Signature]* DATE: 2/6/2015

DIRECTOR: *[Signature]* DATE: 2/6/2015

PRINTED BY: *[Signature]* DATE: 2/6/2015

PORT ADDRESS: ONE SITCOM PLAZA
TACOMA, WA 98401-1837

PIER 4 PHASE 1

REMOVAL ACTION PROJECT

DREDGE PLAN

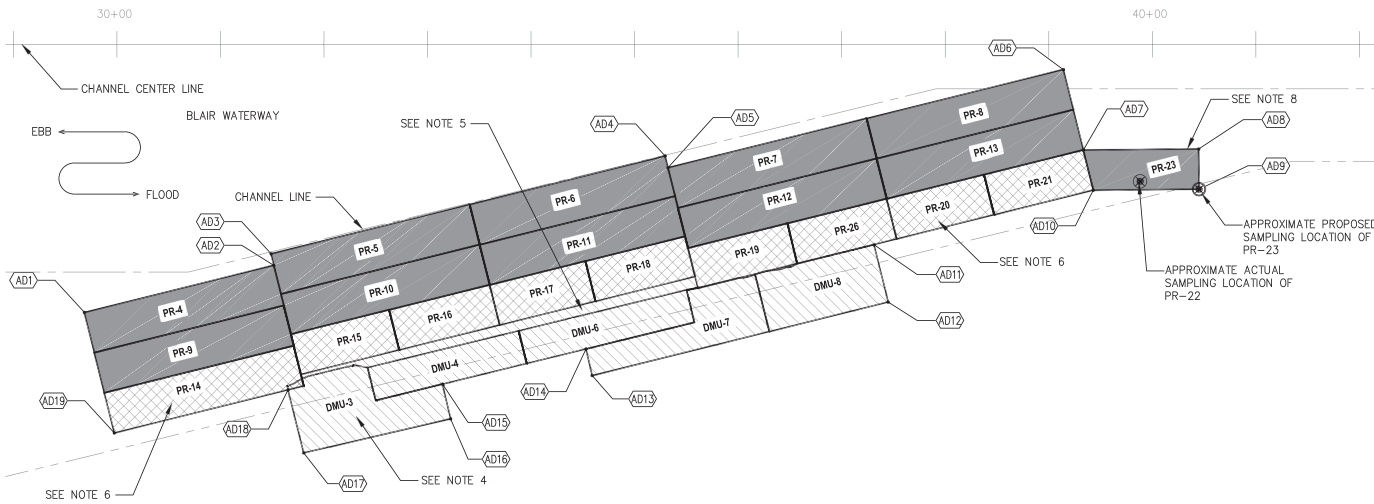
TOWNSHIP: 21N RANGE: 3E SECTION: 27

CONT/CONS: 069942 SH 23 OF 54

M. ID: 091452

PHASE: BID

C1.1



ADDITIONAL DREDGING PLAN

SCALE: 1"=60'

NOTES

- SEE CONTRACT DRAWING C1.1 FOR ADDITIONAL INFORMATION NOT SHOWN ON THIS SHEET.
- DREDGE MANAGEMENT UNIT (DMU) AND PERIMETER UNIT (PR) BOUNDARIES PROVIDED TO THE CONTRACTOR AS DWG, DXF AND EXCEL DATA FILES. ONLY ADDITIONAL DREDGE FOOTPRINT CONTROL POINTS ARE INCLUDED ON THIS SHEET.
- CONTRACTOR SHALL PROVIDE BUCKET DROP INFORMATION TO CONFIRM COMPLETE DREDGE COVERAGE OF EACH DMU AND PR BOUNDARY AREA.
- PROGRESS SURVEY DATA, AS SINGLE BEAM SOUNDINGS, SHALL BE PROVIDED FOLLOWING THE COMPLETION OF DMU-3 TO CONFIRM THAT HIGH SPOT FOUND DURING THE FINAL SURVEY (DATED 12/31/15) HAS BEEN REMOVED TO THE SATISFACTION OF THE ENGINEER.
- GAP IN BOUNDARIES BETWEEN DMU-3, DMU-4, & DMU-6 AND PR-15, PR-16, PR-17 & PR-18 SHALL BE DREDGED AS DMU AREA.
- ADDITIONAL DREDGING WITHIN THE BOUNDARY OF PR-14 AND PR-20 SHALL INCLUDE SEDIMENT REMOVAL TO PRE-DREDGE SURFACE. ADDITIONAL 1 FOOT OF DREDGE NOT REQUIRED.
- PER SPECIFICATION SECTION 35 20 23 1.05.F.1, THE PROVISIONS FOR PAYABLE OVER-DREDGE DEPTH, MAXIMUM ALLOWABLE OVERDREDGE DEPTH, AND EXCESSIVE DREDGING ALL APPLY TO THE ADDITIONAL DREDGING SHOWN ON THIS PLAN.
- PR-23 BOUNDARY INTENDED TO EXCLUDE EXISTING SLOPE ARMORING RIPRAP. CONTRACTOR SHALL NOTIFY PORT ENGINEER IF DREDGING ENCOUNTERS RIPRAP WITHIN THE PR-23 BOUNDARY AND PROVIDE REVISED BOUNDARY RECOMMENDATIONS BASED ON FIELD OBSERVATION.

LEGEND



DMU ADDITIONAL DREDGING: INDICATES EXTENT OF ADDITIONAL DREDGING, DREDGE SEDIMENT TO ORIGINAL DESIGN SURFACE PLUS AN ADDITIONAL 1 FOOT MINIMUM. EXISTING AREAS WITHIN THE DMU THAT ARE BELOW THE ORIGINAL DESIGN SURFACE SHALL BE DREDGED 1 FOOT MINIMUM.



PR ADDITIONAL DREDGING IN AREA WITH MOUND ALONG TOE OF SLOPE: INDICATES EXTENT OF ADDITIONAL DREDGING, DREDGE SEDIMENT TO PRE-DREDGE SURFACE PLUS AN ADDITIONAL 1 FOOT MINIMUM.



PR ADDITIONAL DREDGING: INDICATES EXTENT OF ADDITIONAL DREDGING, DREDGE SURFACE 1 FOOT MINIMUM BELOW EXISTING SURFACE.



ADDITIONAL DREDGE CONTROL POINTS

ADDITIONAL DREDGE CONTROL POINTS		
POINT ID	NORTHING	EASTING
AD1	713441.63	1166726.10
AD2	713346.85	1166889.11
AD3	713356.77	1166895.02
AD4	713159.63	1167234.05
AD5	713149.65	1167228.25
AD6	712951.90	1167565.34
AD7	712882.74	1167528.12
AD8	712805.88	1167608.83
AD9	712777.70	1167582.00
AD10	712848.16	1167508.02
AD11	712957.74	1167319.26
AD12	712908.44	1167290.58
AD13	713079.04	1167049.45
AD14	713056.45	1167035.86
AD15	713151.11	1166926.31
AD16	713121.45	1166808.52
AD17	713196.76	1166783.81
AD18	713250.95	1166815.30
AD19	713337.89	1166665.78

DREDGING SEQUENCE		
ORDER	UNITS	NOTES
1	DMU-3, DMU-4, DMU-6, DMU-7, & DMU-8	DREDGING OF FIRST ORDER UNITS MAY OCCUR IN ANY SEQUENCE, HOWEVER SHALL PROCEED FROM TOP TO BOTTOM.
2	PR-9, PR-10, PR-11, PR-12, PR-13, PR-14, PR-15, PR-16, PR-17, PR-18, PR-19, PR-26, PR-20, & PR-21	DREDGING OF SECOND ORDER UNITS MAY OCCUR IN ANY SEQUENCE, FOLLOWING COMPLETION OF FIRST ORDER UNITS
3	PR-4, PR-5, PR-6, PR-7, & PR-8, & PR-23	FOLLOWING THE COMPLETION OF SECOND ORDER UNITS, DREDGE THIRD ORDER UNITS SEQUENTIALLY FROM NORTH TO SOUTH
4	DMU-3, DMU-4, DMU-6, DMU-7, DMU-8	UNITS SHALL BE DREDGED A SECOND TIME, DUE TO SLOPE MATERIAL MOVEMENT AND ELEVATION OF MATERIAL BEING BELOW PHASE 2 DREDGE PRISM, NORTHERN HALF OF DMU-4 IS EXEMPT FROM SECOND PASS OF ADDITIONAL DREDGING.

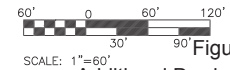


Figure 5.3
Additional Dredge Plan

		DATE:	
		BY:	
RECORD DRAWINGS:		MARK:	REVISION:
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PIER 4 PHASE 1 REMOVAL ACTION PROJECT ADDITIONAL DREDGING PLAN		C1.1A SH 25 OF 57	
APPROVED:	SEK 1/15/2016	CHECKED BY:	DATE
DIRECTOR:	ENG. DATE	PROJ. ENGR.	DATE
PRINTED BY:	tiemans Apr 01, 2016	PORT ADDRESS:	SITUM PLAZA
TOWNSHIP:	21N	RANGE:	3E
DAT-HRZ:	091452	MLW 19.39' @ Tide 22 1933	SECTION: 27
PHASE:	RECORD DRAWINGS	PARCEL:	DRAWING SCALE: AS NOTED

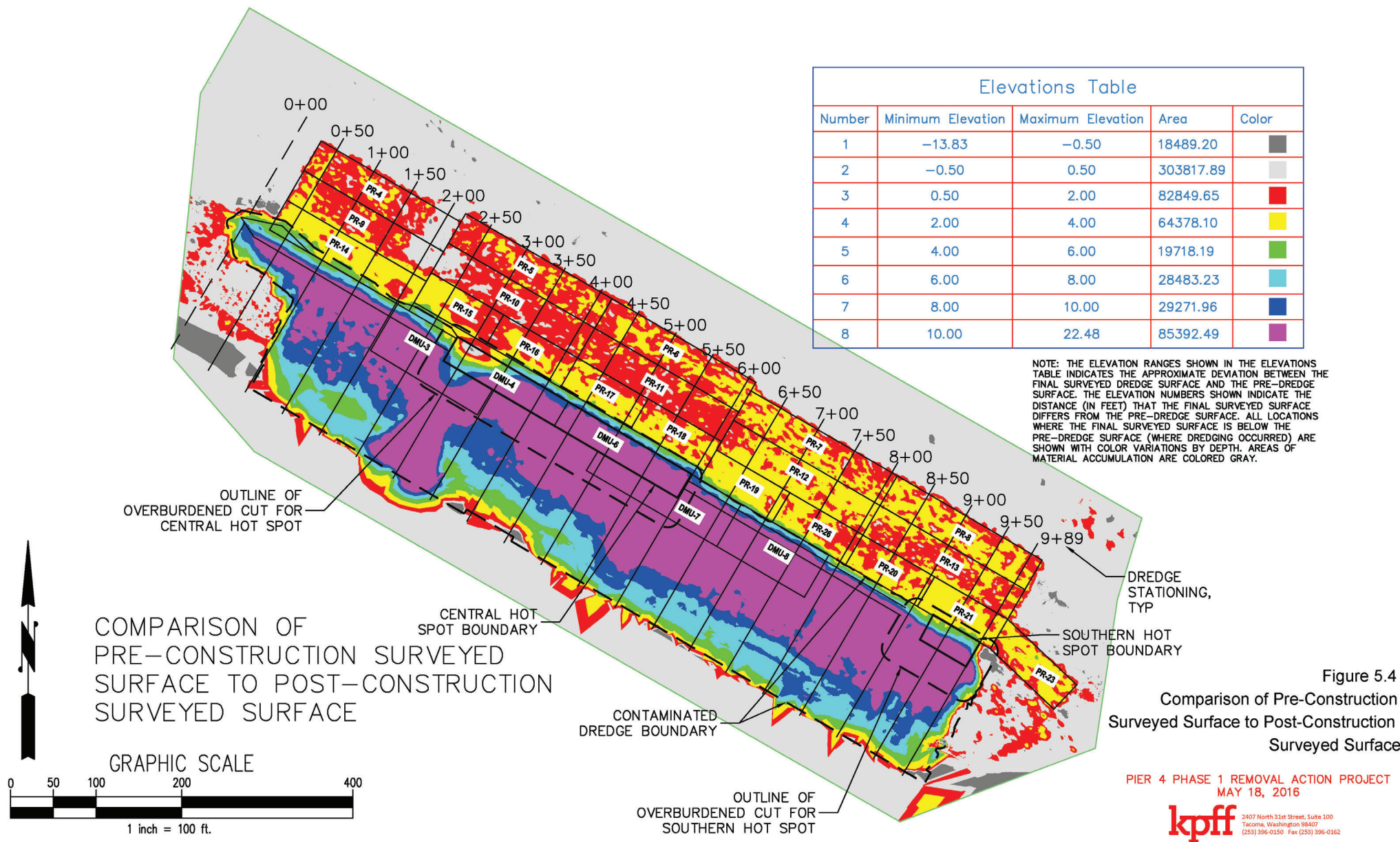
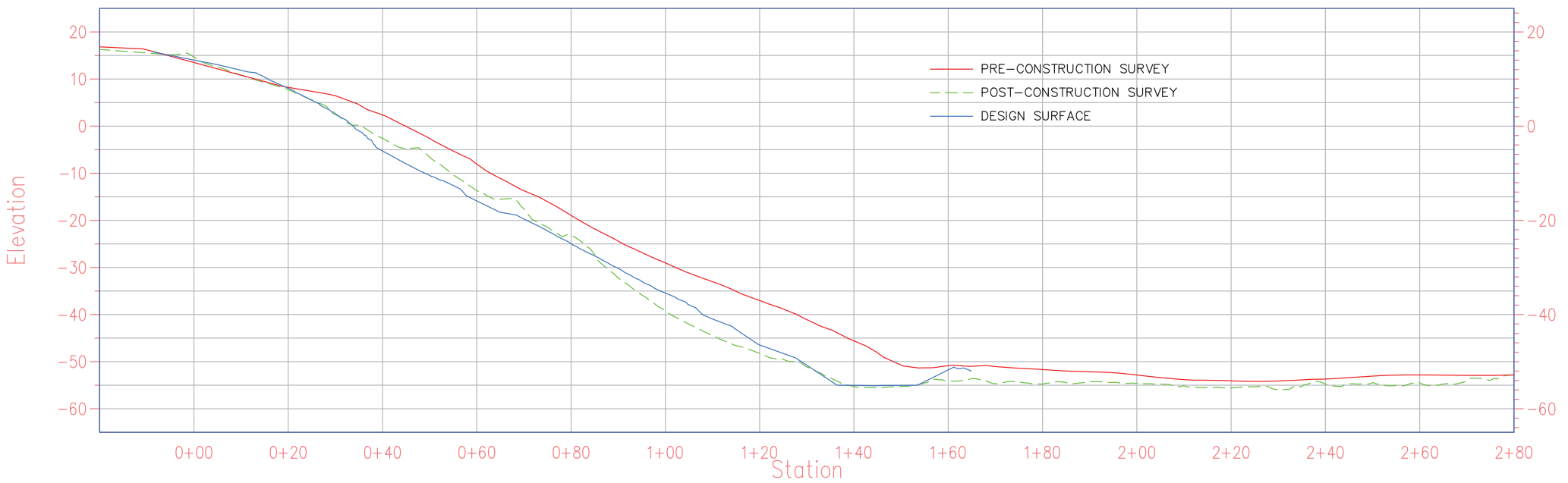


Figure 5.4
Comparison of Pre-Construction
Surveyed Surface to Post-Construction
Surveyed Surface

PIER 4 PHASE 1 REMOVAL ACTION PROJECT
MAY 18, 2016

kpff
2407 North 31st Street, Suite 100
Tacoma, Washington 98407
(253) 396-0150 Fax (253) 396-0162

THIS SURFACE COMPARISON CROSS SECTION WAS COMPILED FROM DATA OBTAINED FROM THE CONSTRUCTION DESIGN DRAWINGS PREPARED BY KPFF AND BATHYMETRIC SURVEY INFORMATION PROVIDED BY THE CONTRACTOR.



PIER 4 PHASE 1 REMOVAL ACTION PROJECT
MAY 18, 2016

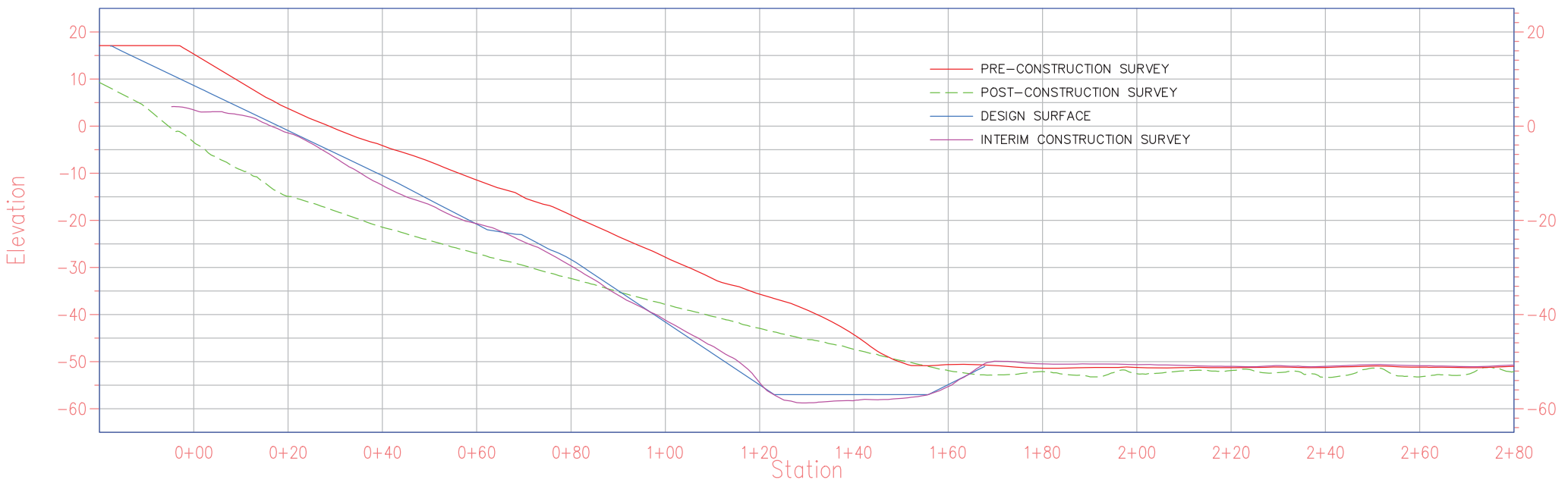
kpff
2407 North 31st Street, Suite 100
Tacoma, Washington 98407
(253) 396-0150 Fax (253) 396-0162

SECTION CUT 1+00 PROFILE



Figure 5.5
Dredge Section 1+00

THIS SURFACE COMPARISON CROSS SECTION WAS COMPILED FROM DATA OBTAINED FROM THE CONSTRUCTION DESIGN DRAWINGS PREPARED BY KPFF AND BATHYMETRIC SURVEY INFORMATION PROVIDED BY THE CONTRACTOR.



PIER 4 PHASE 1 REMOVAL ACTION PROJECT
MAY 18, 2016

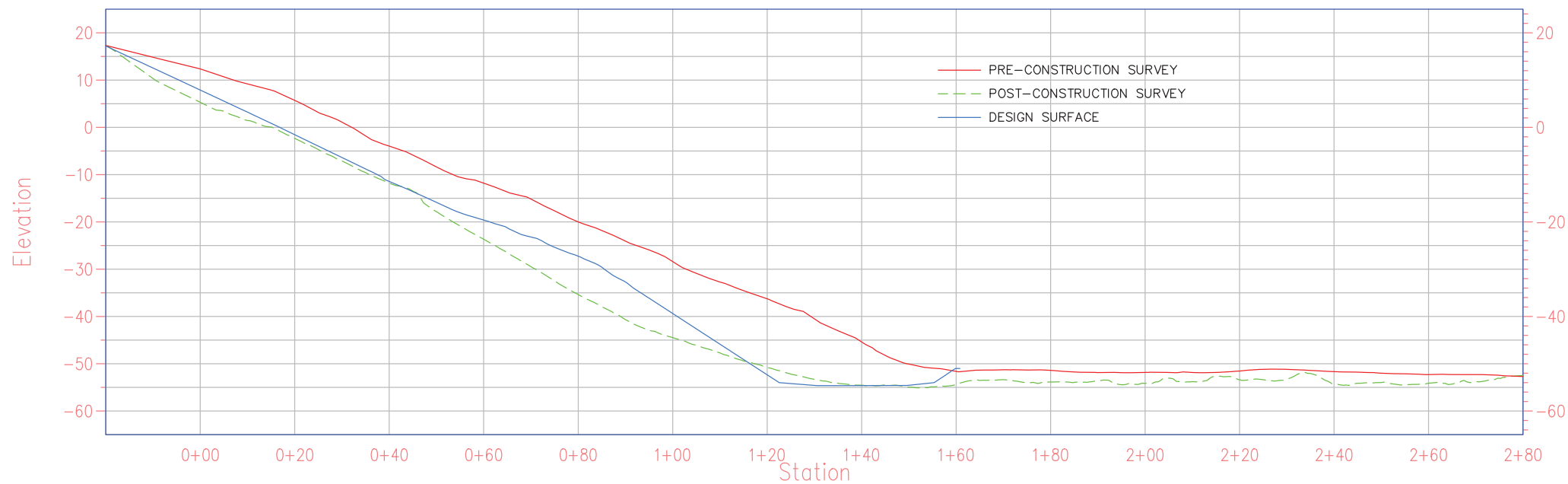
kpff
2407 North 31st Street, Suite 100
Tacoma, Washington 98407
(253) 396-0150 Fax (253) 396-0162

SECTION CUT 3+00 PROFILE



Figure 5.6
Dredge Section 3+00

THIS SURFACE COMPARISON CROSS SECTION WAS COMPILED FROM DATA OBTAINED FROM THE CONSTRUCTION DESIGN DRAWINGS PREPARED BY KPFF AND BATHYMETRIC SURVEY INFORMATION PROVIDED BY THE CONTRACTOR.



PIER 4 PHASE 1 REMOVAL ACTION PROJECT
MAY 18, 2016

kpff
2407 North 31st Street, Suite 100
Tacoma, Washington 98407
(253) 396-0150 Fax (253) 396-0162

SECTION CUT 9+50 PROFILE



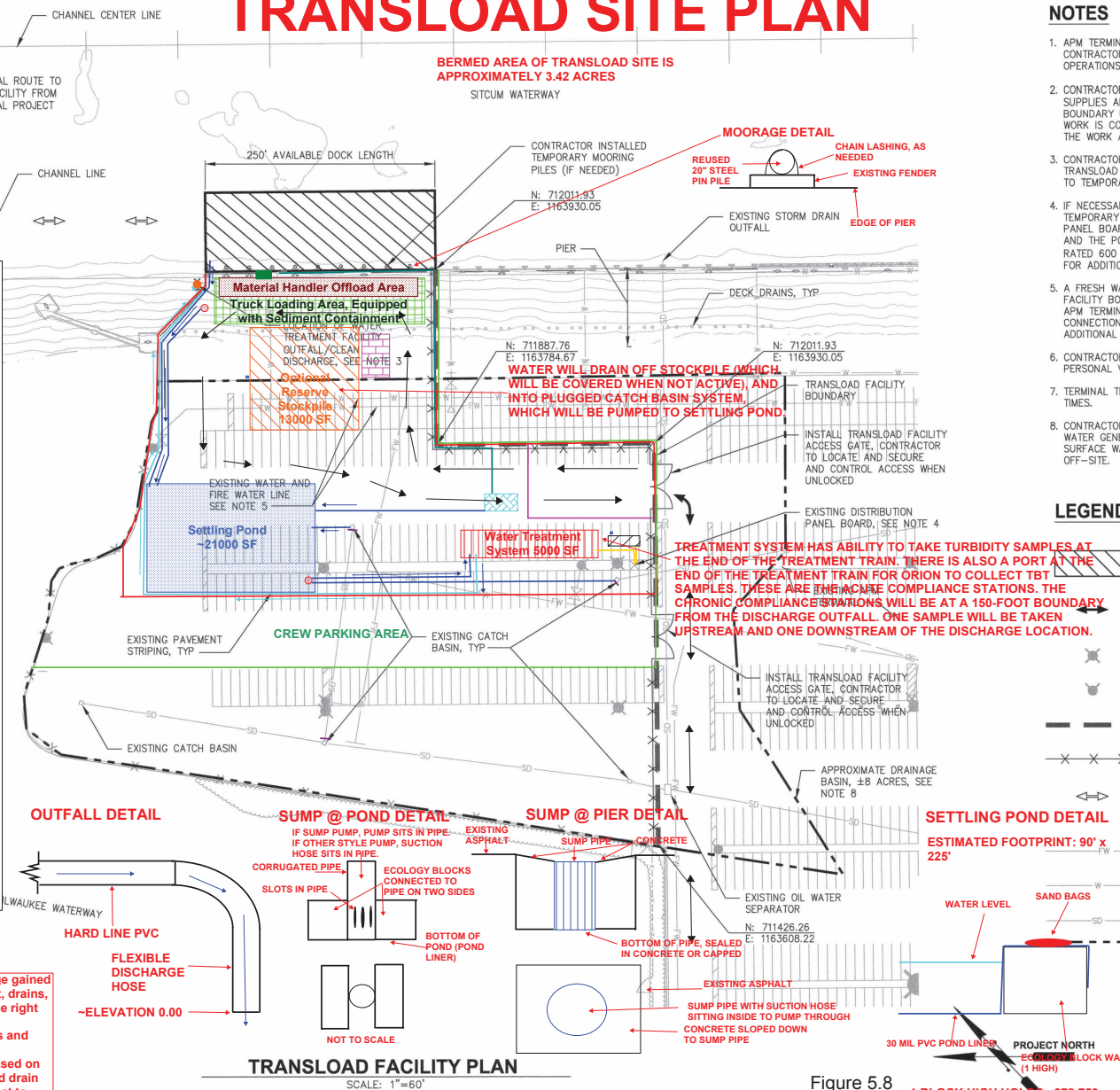
Figure 5.7
Dredge Section 9+50

TRANSLOAD SITE PLAN

BERMED AREA OF TRANSLOAD SITE IS APPROXIMATELY 3.42 ACRES

SITCUM WATERWAY

- Key**
- Truck Route
 - Electrical Conduit, Power Metered.
 - Above-Ground PVC Influent Drain Line
 - Above-Ground PVC Effluent Drain Line
 - Concrete Curb (6" tall, but may vary), as necessary, to limit stormwater infiltrating site
 - Wheel Wash, BMP C106
 - Plug Drain Line
 - Optional Drying Agent Stockpile
 - Sump
 - Office Trailer
 - Portable Toilets
 - Spill Apron
 - Chain Link Temporary Fence
 - Water Supply Line with Ramp for Trucks to Drive Over
 - Contamination Reduction Corridor (CRC) w/ Berm/Ramp and Boot Washing Supplies
 - Discharge Outfall



NOTE: Site plan is created based on knowledge gained from site walks. Actual locations of equipment, drains, and BMPs may vary slightly. OMCI reserves the right to alter locations to increase workability and functionality. Current storm drain catch basins and sump locations have been chosen based on information/drawings provided by the Port. Based on the information given, the entire project should drain to these locations, however, this may be subject to change based on the actual site drainage paths.

NOTES

- APM TERMINAL IS A SECURED OPERATING TERMINAL. THE CONTRACTOR SHALL NOT INTERFERE WITH TERMINAL OPERATIONS.
- CONTRACTOR SHALL STOCKPILE AND STAGE ALL EQUIPMENT, SUPPLIES AND MATERIALS WITHIN THE TRANSLOAD FACILITY BOUNDARY UNLESS NOTED OTHERWISE. WHEN CONTRACT WORK IS COMPLETE CONTRACTOR SHALL CLEAR AND CLEAN THE WORK AREA.
- CONTRACTOR TO DETERMINE PIPE ROUTING ACROSS THE TRANSLOAD FACILITY FROM THE WATER TREATMENT FACILITY TO TEMPORARY OUTFALL LOCATION.
- IF NECESSARY, CONTRACTOR SHALL CONSTRUCT A TEMPORARY POWER FEED FROM THE EXISTING DISTRIBUTION PANEL BOARD AND SHALL COORDINATE WITH APM TERMINALS AND THE PORT. THE EXISTING DISTRIBUTION PANEL BOARD IS RATED 600 AMPS, 480Y/277 VOLTS, SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- A FRESH WATER SYSTEM EXISTS WITHIN THE TRANSLOAD FACILITY BOUNDARY, CONTRACTOR SHALL COORDINATE WITH APM TERMINALS AND THE PORT IF A TEMPORARY WATER CONNECTION IS REQUIRED, SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- CONTRACTOR SHALL NOT PARK ANY EQUIPMENT OR PERSONAL VEHICLES OUTSIDE TRANSLOAD FACILITY.
- TERMINAL TRAFFIC SHALL HAVE RIGHT-OF-WAY AT ALL TIMES.
- CONTRACTOR SHALL COLLECT AND TREAT ALL SURFACE WATER GENERATED BOTH ON-SITE AS WELL AS ANY SURFACE WATER ENTERING THE TRANSLOAD FACILITY FROM OFF-SITE.

LEGEND

- CONTRACTOR BERTHING LOCATION
- CONTRACTOR TRUCK ACCESS ROUTE
- LIGHT POLE
- FIRE HYDRANT
- TRANSLOAD FACILITY BOUNDARY
- INSTALL TEMPORARY FENCE
- CONTRACTOR TRANSLOAD FACILITY
- SETTLING POND CONTINGENCY PLAN DETAIL
- WATER
- STORM DRAIN
- DRAINAGE BASIN
- WATER LEVEL
- SAND BAGS
- ECOLGY BLOCK WALL (2 HIGH)
- 30 MIL PVC POND LINER
- PROJECT NORTH
- 1 BLOCK HIGH HOLDS ~378,750 GALLONS OF WATER
- 2 BLOCKS HIGH HOLDS ~757,500 GALLONS OF WATER

Figure 5.8
Transload Site Configuration

Port of Tacoma
1000 West 10th Street, Suite 120
Tacoma, Washington 98407
(253) 396-6100 Fax (253) 396-6102

kpff
Kaiser Power Fund
1000 West 10th Street, Suite 120
Tacoma, Washington 98407
(253) 396-6100 Fax (253) 396-6102

DATE:	2/6/2015
APPROVED:	2-6-15
BY:	2/6/2015
REVISION:	2/6/2015
MARK:	2/6/2015

PIER 4 PHASE 1
REMOVAL ACTION PROJECT
TRANSLOAD FACILITY PLAN

TOWNSHIP: 21N RANGE: 3E SECTION: 27
CONT/CONS: 069982
M. ID: 091452
DATE-HRZ: WAB3-SF
DRAWING SCALE: AS NOTED
PARCEL: TACOMA, WA 98401-1837

SWK CHECKED BY DATE
MDK 2/6/2015
DIRECTOR ENG. DATE
PRINTED BY: Aving Feb 04, 2015
PORT ADDRESS: ONE SITCUM PLAZA
TACOMA, WA 98401-1837

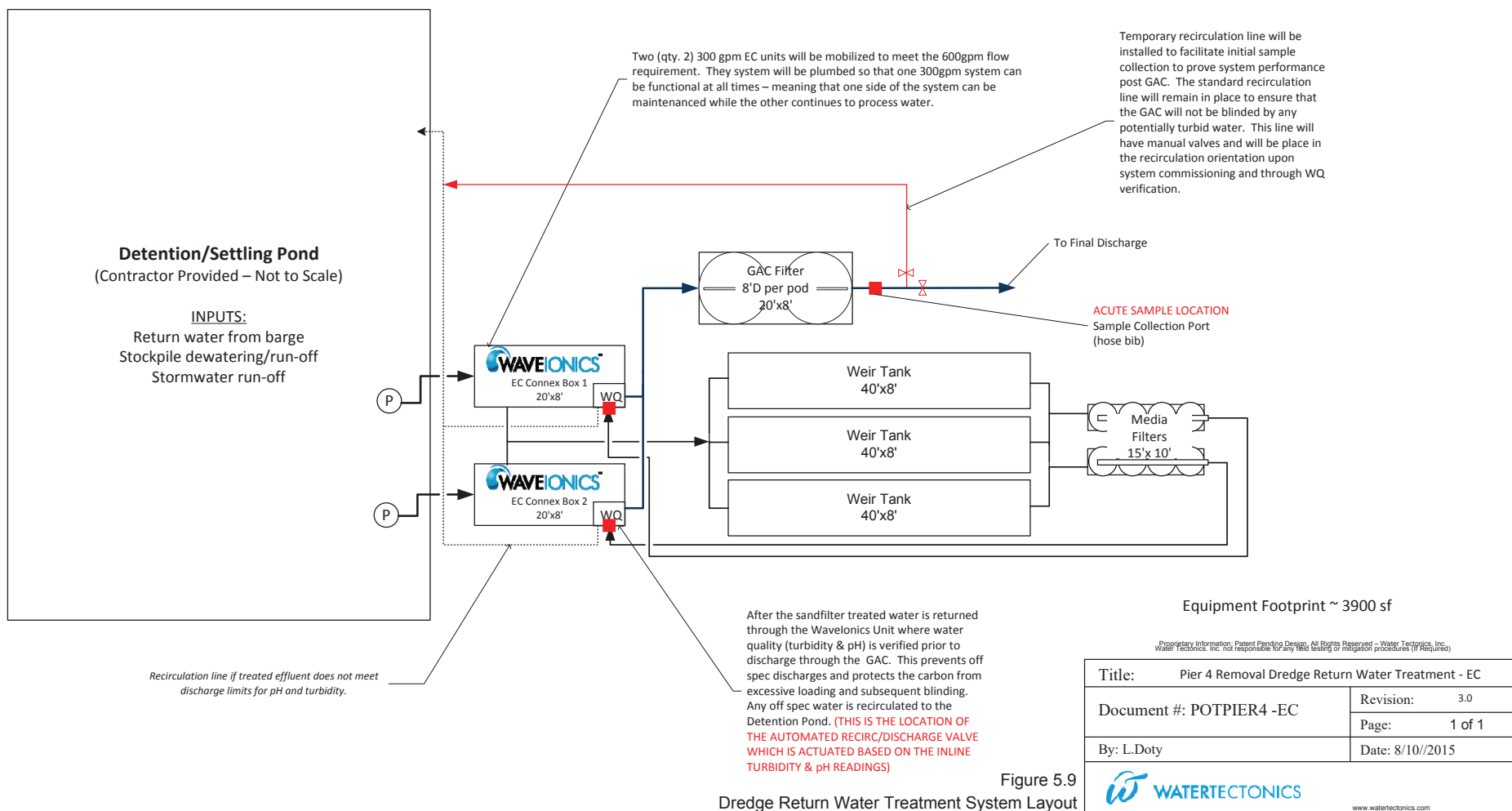
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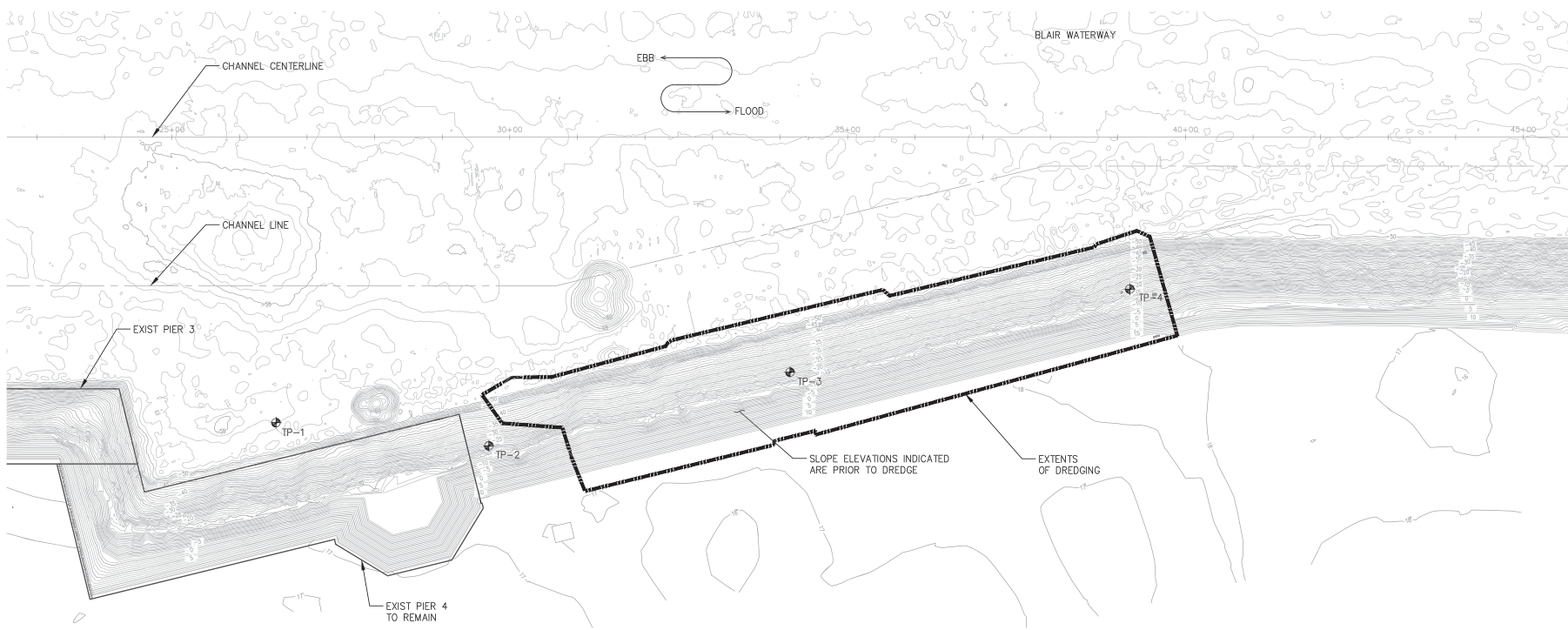
Pier 4 Removal – Phase 1

Dredge Return Water Treatment Options

EC - 600gpm Hydraulic Capacity

REVISION HISTORY			
Rev	Description	Date	Change Originator
1	Initial Release	3/5/2015	L.Doty
2	Revised per KPFF/FS/ASPECT Comments	7/15/2015	L.Doty
3	Revised per ASPECT Comments	8/10/215	L.Doty





1 TEST PILE LOCATION PLAN
SCALE: 1"=80'

NOTES

1. EXISTING BATHYMETRY SHOWN. TEST PILES SHALL BE INSTALLED AFTER COMPLETION OF DREDGE WORK INDICATED ON DRAWING C1.1. SEE SPECIFICATIONS FOR ADDITIONAL TIMING RESTRICTIONS FOR TEST PILE INSTALLATION AND REMOVAL.
2. ALL TEST PILES SHALL BE DRIVEN TO THE MINIMUM TIP ELEVATIONS INDICATED.
3. ALL TEST PILES SHALL BE COMPLETELY EXTRACTED AND DISPOSED OF AFTER COMPLETION OF THE TEST PILE PROGRAM.
4. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION REGARDING THE TEST PILE PROGRAM.

TEST PILE SCHEDULE						
DESIGNATION	PILE TYPE	FINAL TIP ELEVATION	TOP OF PILE ELEVATION	TOTAL PILE LENGTH	NORTHING	EASTING
TP-1	24" SOLID OCTAGONAL PRESTRESSED CONCRETE	-126.65	24.65	151.3	713542.97	1166386.36
TP-2	24" SOLID OCTAGONAL PRESTRESSED CONCRETE	-116.5	19.46	135.96	713299.05	1166588.67
TP-3	24" SOLID OCTAGONAL PRESTRESSED CONCRETE	-128.85	19.64	148.49	713067.02	1166984.69
TP-4	24" SOLID OCTAGONAL PRESTRESSED CONCRETE	-117.75	18.76	136.61	712805.37	1167431.41

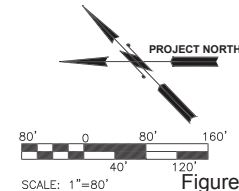


Figure 5.10
Locations of Concrete Test Piling

kpff
Kaiser Power Fund
Tacoma, Washington 98407
(253) 386-0150 Fax (253) 386-0162
PORT OF TACOMA WA 98401-1837

RECORD DRAWINGS:
THESE RECORD DRAWINGS
WAS PREPARED BY
INFORMATION PROVIDED BY
OTHERS. KPFF HAS NOT
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THIS INFORMATION

APPROVED:
CHECKED BY: DATE:
TAK 2/6/2015
DIRECTOR: ENG. DATE:
PRINTED BY: Tietmons Apr 01, 2016
PORT ADDRESS: ONE SICOUM PLAZA
TACOMA, WA 98401-1837

PIER 4 PHASE 1
REMOVAL ACTION PROJECT
TEST PILE LOCATION PLAN

S1.1
SH 38 OF 57
CONT./CONS: 069982
M. ID: 091452
PHASE: RECORD DRAWINGS

TOWNSHIP: 21N RANGE: 3E SECTION: 27
DAT-HRZ: WA83-SF VERT: MLW 19.39' @ Tide 22 1933
DRAWING SCALE: AS NOTED

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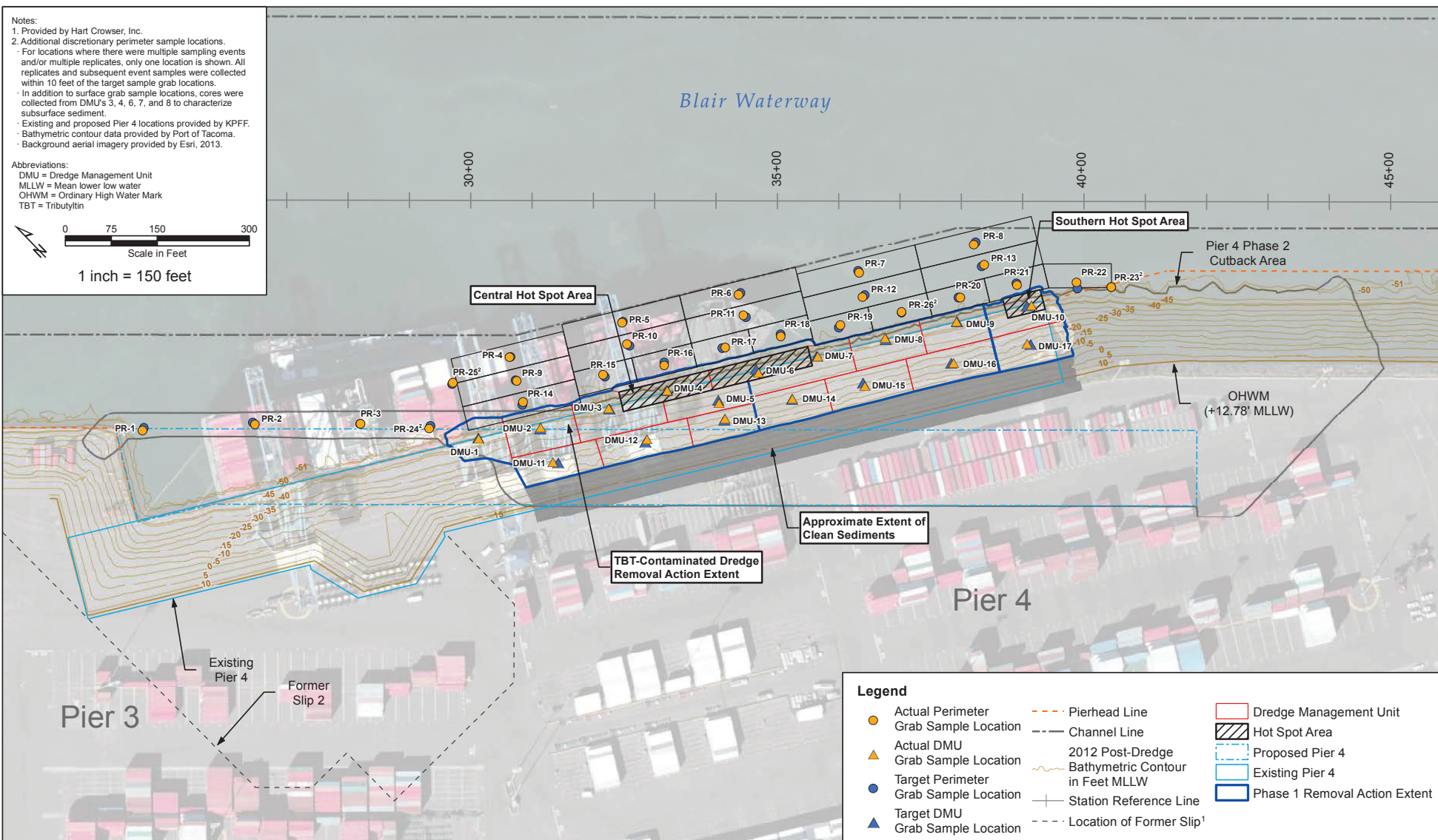
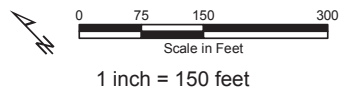
Notes:

1. Provided by Hart Crowder, Inc.
2. Additional discretionary perimeter sample locations.

- For locations where there were multiple sampling events and/or multiple replicates, only one location is shown. All replicates and subsequent event samples were collected within 10 feet of the target sample grab locations.
- In addition to surface grab sample locations, cores were collected from DMU's 3, 4, 6, 7, and 8 to characterize subsurface sediment.
- Existing and proposed Pier 4 locations provided by KPFF.
- Bathymetric contour data provided by Port of Tacoma.
- Background aerial imagery provided by Esri, 2013.

Abbreviations:

- DMU = Dredge Management Unit
- MLLW = Mean lower low water
- OHWM = Ordinary High Water Mark
- TBT = Tributyltin



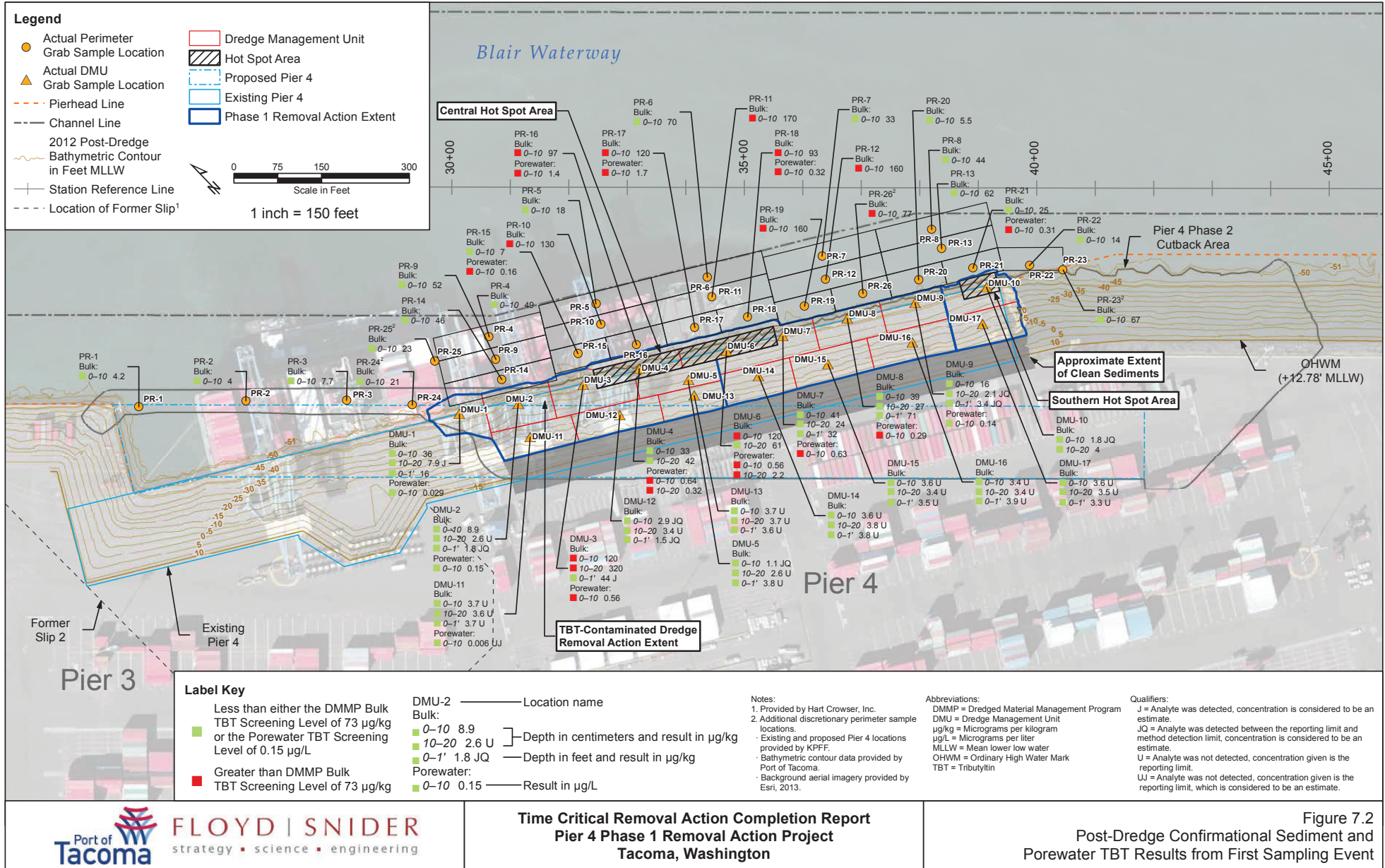
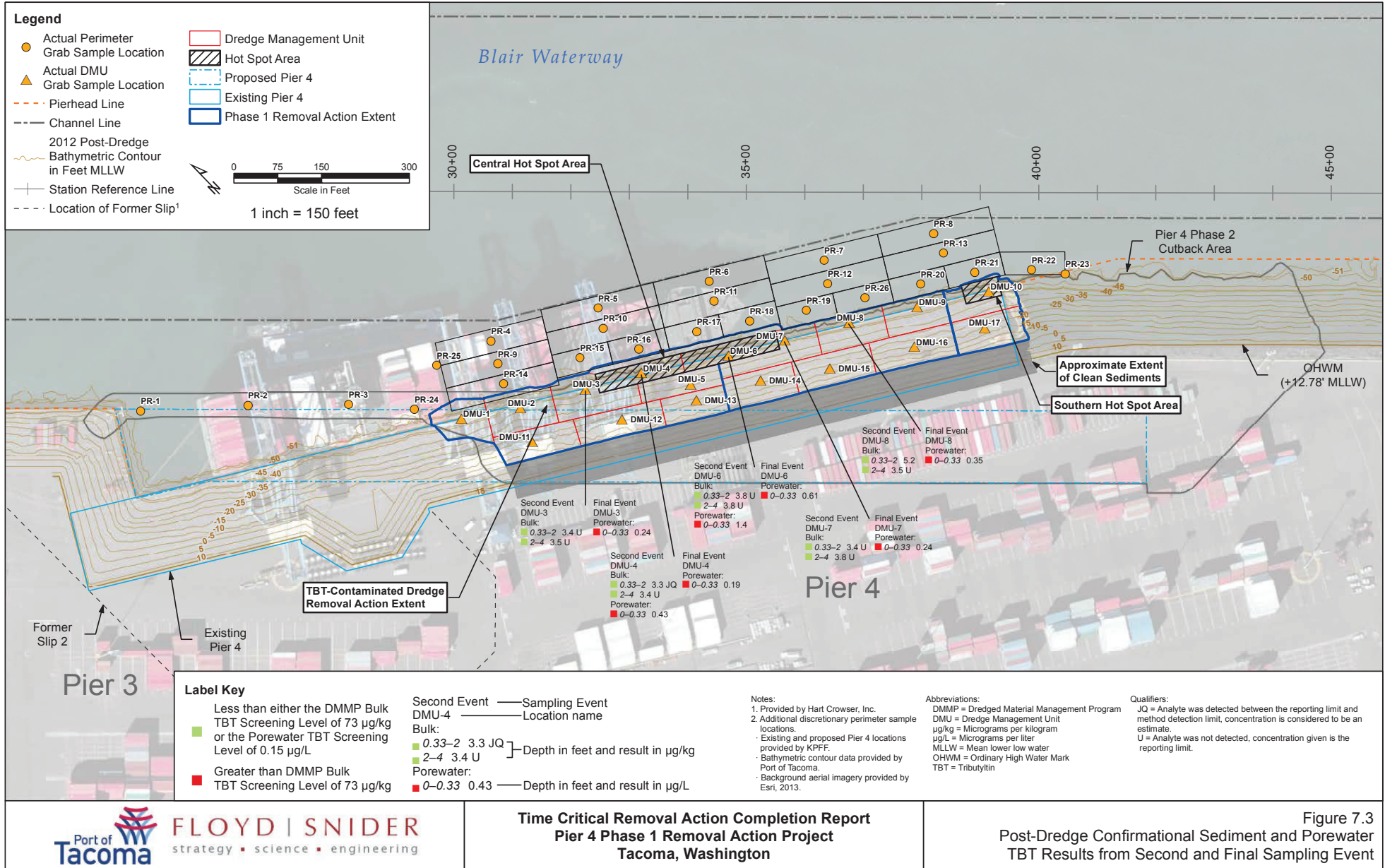


Figure 7.2
Post-Dredge Confirmational Sediment and Porewater TBT Results from First Sampling Event



Pier 4
Phase 1 Removal Action
Time Critical Removal
Action Completion Report

Appendix A
Photographs Representative of Removal
Action Activities



Photograph 1. Temporary floating boom and pile pulling.



Photograph 2. Demolition of the pier.



Photograph 3. Temporary stockpile of concrete and rebar.



Photograph 4. Oil-impacted ballast.



Photograph 5. Debris catching floats under deck demolition activities.



Photograph 6. Piles being removed and transferred to shore.



Photograph 7. Vibratory pile removal.



Photograph 8. Steel pipe piles with sediment.



Photograph 9. Concrete pile remnants and in place piles for slope stabilization.



Photograph 10. Concrete piles left in place for slope stabilization.



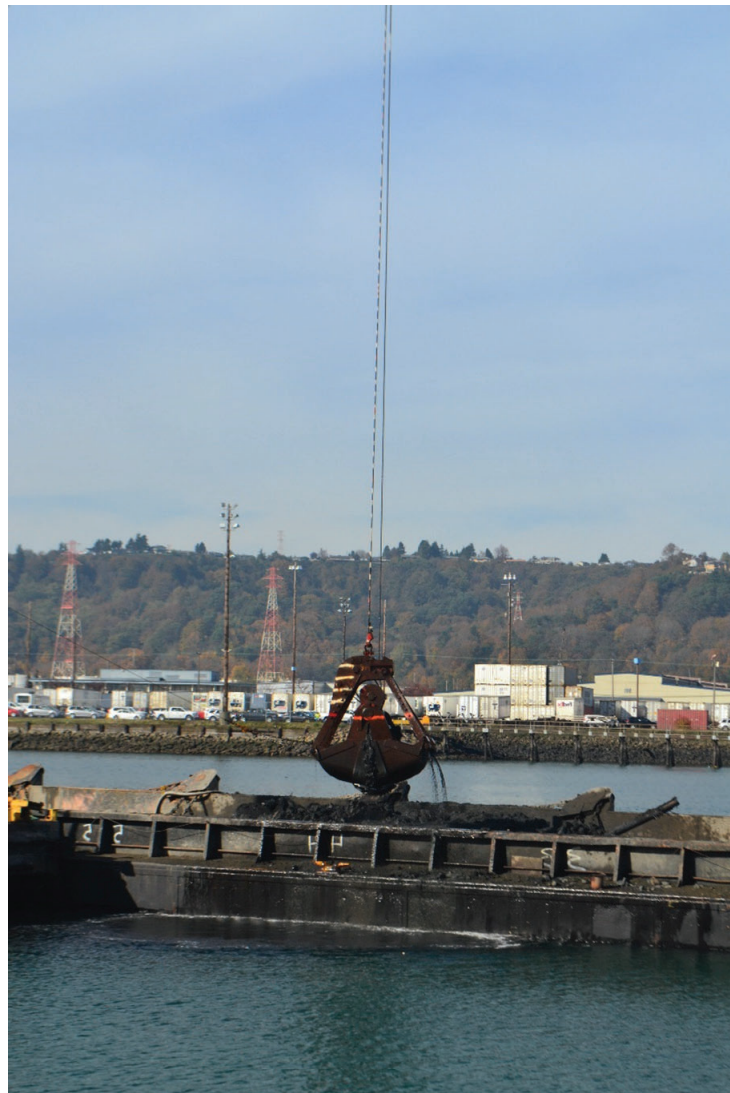
Photograph 11. In place concrete piles in front of substation.



Photograph 12. Geotextile fabric and sand bags placed on slope for temporary erosion control.



Photograph 13. Turbid water releasing from bucket during dredging.



Photograph 14. Closed bucket during dredging.



Photograph 15. Floating boom-supported turbidity curtain prior to deployment.



Photograph 16. Floating boom-supported turbidity curtain during deployment.



Photograph 17. Floating boom-supported turbidity curtain in use during hot spot dredging.



Photograph 18. Crack sealing at APM Terminals.



Photograph 19. Installation of temporary mooring steel piles at APM Terminals to protect the fender system.



Photograph 20. Set up of the settling pond at APM Terminals.



Photograph 21. Spill apron with filter fabric adjacent to edge of pier at APM Terminals.



Photograph 22. Water treatment system and GAC filters at APM Terminals.



Photograph 23. Water treatment system media filters and weir tanks at APM Terminals.



Photograph 24. Accumulated sediment on spill apron at APM Terminals.



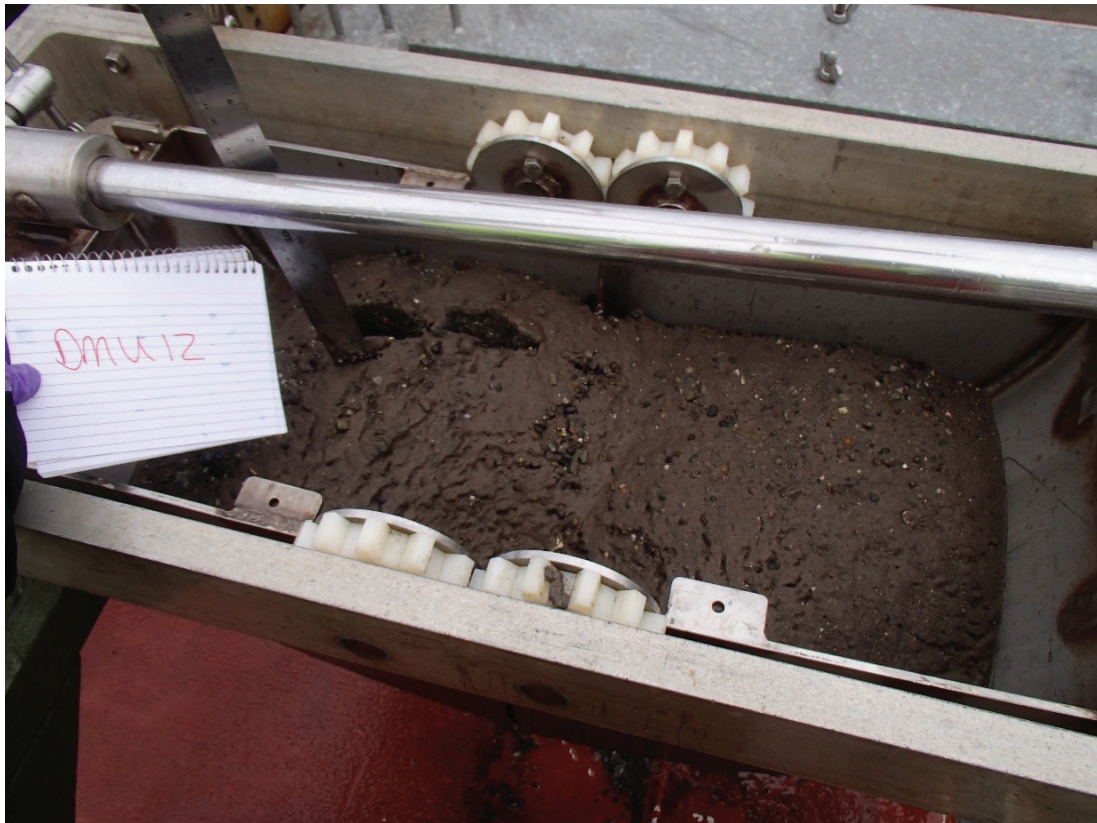
Photograph 25. Transloading of sediment and rock armoring at APM Terminals



Photograph 26. Accumulated water in the settling pond at APM Terminals.



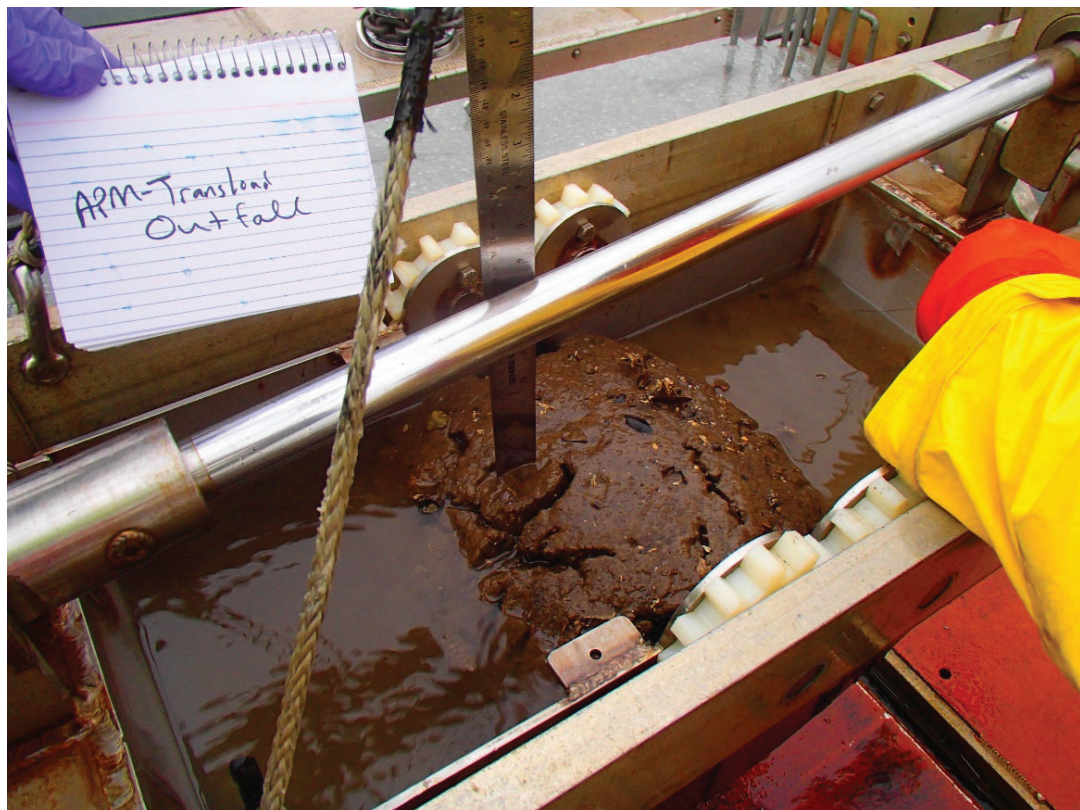
Photograph 27. Sediment sampling during first event.



Photograph 28. Power grab sediment sample at DMU-12 during first sampling event.



Photograph 29. Van Veen sediment sample at PR-13 during first sampling event.



Photograph 30. Power grab sediment sample at the APM Terminals Transload outfall location during first sampling event.



Photograph 31. Sediment core from DMU-7 during second sampling event.



Photograph 32. Power grab sediment sample at DMU-6 during second sampling event.



Photograph 33. Power grab sediment sample at DMU-6 during final sampling event.

Pier 4
Phase 1 Removal Action
Time Critical Removal
Action Completion Report

Appendix B
Waste Characterization and Disposal
Documentation

No. 1843

Tacoma - Pierce County
Health Department
 Healthy People in Healthy Communities

www.tpchd.org

WASTE DISPOSAL AUTHORIZATION

Tacoma Pierce County
 Health Department

☐ Non-Asbestos☒ New☐ Asbestos (PSCAA Case # _____)☐ Amendment

11/21/2014 9:39:26 AM

Clerk 53-T5

Waste Disposal Auth Initial
 \$145.00

Receipt #360994

ck200155 Port of Tac 1101 Port of

A. Generator Name: Port of Tacoma - Pier 4B. Generator Address: 1101 Port of Tacoma Road, Pier 4, Tacoma, WAC. Transporter Name: To Be DeterminedD. Technical Contact: Scott Hooten, Port of Tacoma Phone: (253)383-9428E. Waste Description: Contaminated Dredge Sediments - Port of Tacoma Pier 4 on the Blair Waterway

☐ Sludge ☒ Solid ☐ PCS ☒ Other

F. Approved Quantity: 80,000 Tons (~50,000 Yds³)

G. Actual Quantity (Filled in upon disposal): _____

H. Multiple Loads: ☒ Yes ☐ NoI. Dates of Disposal: January 1, 2015 through December 31, 2015J. Testing: LPAH, HPAH, Dioxins/Furans, Pesticides, Metals (including Tributyltin), PCB's, Phenols, VOC'sK. Reviewed by Department of Ecology: ☐ Yes ☒ No

L. Disposal/Transportation Requirements: A copy of this WDA must be transported with EACH load of waste and presented to the LRI Landfill Scalehouse Operator. These sediments qualify for management as a Special Waste per WAC 173-303-073, Conditional Exclusion of Special Wastes. As such, sediments are suitable for disposal in a MSWLF permitted in accordance with Chapter 173-351 WAC. Sediments are currently authorized for disposal only, unless LRI can demonstrate to the satisfaction of the TPCHD that the sediments physical characteristics are suitable for use as an ADC. Sediments shall be sufficiently dewatered such that they pass the Paint Filter Test prior to transport. In the event that liquids separate during transportation, the trucks must contain 100% of the liquids within the transportation vehicle. No leakage or spillage during transportation is acceptable and may result in revocation of this WDA. Load sizes shall comply with conditional-use and solid waste permit criteria.

M. Facility: ☒ LRI Landfill (304th Street LF), 30919 Meridian Street, Eatonville, WA**CERTIFICATION**

I hereby certify that I have personally examined and am familiar with the information submitted in this document and any supporting material. Based on my inquiry of those individuals immediately responsible for obtaining the information, the information submitted is true, accurate and complete to the best of my knowledge and ability and that all known and suspected hazards have been disclosed. I agree that the generator and/or transporter will abide by all conditions specified in line (L) or any attachments thereto.

11/21/14

Date

ENV. PROGRAMS ANALYST

Title

Signature

AUTHORIZED BY:

APPROVED**OCT 29 2014**

Andy Comstock, TPCHD

(253)798-6538

TACOMA-PIERCE COUNTY HEALTH DEPT.
ENVIRONMENTAL HEALTH DIV.
 For Official Use Only

Cc: LRI LF Scalehouse via Fax - 253 875 7205

No. 1843a

Tacoma - Pierce County
Health Department
 Healthy People in Healthy Communities

www.tpchd.org

WASTE DISPOSAL AUTHORIZATION

Tacoma Pierce County
 Health Department

☐ Non-Asbestos☐ New

12/18/2015 12:25:07 PM

☐ Asbestos (PSCAA Case # _____)☒ Amendment

Clerk 6-T1

Waste Disposal Auth Renew/Mod
\$80.00

Receipt #402296

A. Generator Name: Port of Tacoma - Pier 4

visa Stebbins 78038 WDA

B. Generator Address: 1101 Port of Tacoma Road, Pier 4, Tacoma, WAC. Transporter Name: To Be DeterminedD. Technical Contact: Scott Hooten, Port of Tacoma Phone: (253)383-9428E. Waste Description: Contaminated Dredge Sediments - Port of Tacoma Pier 4 on the Blair Waterway☐ Sludge ☒ Solid ☐ PCS ☒ OtherF. Approved Quantity: Additional 19000 Tons for a Project Total 99,000 Tons

G. Actual Quantity (Filled in upon disposal): _____

H. Multiple Loads: ☒ Yes ☐ NoI. Dates of Disposal: December 18, 2015 through March 31, 2016J. Testing: LPAH, HPAH, Dioxins/Furans, Pesticides, Metals (including Tributyltin), PCB's, Phenols, VOC'sK. Reviewed by Department of Ecology: ☐ Yes ☒ No

L. Disposal/Transportation Requirements: A copy of this WDA must be transported with EACH load of waste and presented to the LRI Landfill Scalehouse Operator. These sediments qualify for management as a Special Waste per WAC 173-303-073, Conditional Exclusion of Special Wastes. As such, sediments are suitable for disposal in a MSWLF permitted in accordance with Chapter 173-351 WAC. Sediments are currently authorized for disposal only, unless LRI can demonstrate to the satisfaction of the TPCHD that the sediments physical characteristics are suitable for use as an ADC. Sediments shall be sufficiently dewatered such that they pass the Paint Filter Test prior to transport. In the event that liquids separate during transportation, the trucks must contain 100% of the liquids within the transportation vehicle. No leakage or spillage during transportation is acceptable and may result in revocation of this WDA. Load sizes shall comply with conditional-use and solid waste permit criteria.

M. Facility: ☒ LRI Landfill (304th Street LF), 30919 Meridian Street, Eatonville, WA**CERTIFICATION**

I hereby certify that I have personally examined and am familiar with the information submitted in this document and any supporting material. Based on my inquiry of those individuals immediately responsible for obtaining the information, the information submitted is true, accurate and complete to the best of my knowledge and ability and that all known and suspected hazards have been disclosed. I agree that the generator and/or transporter will abide by all conditions specified in line (L) or any attachments thereto.

12/18/2015
 Date

ENVANALYST II
 Title

 Signature

AUTHORIZED BY:

APPROVED

DEC 18 2015

 Keith Johnston, TPCHD

(253)798-6561

TACOMA-PIERCE COUNTY HEALTH DEPT.
 ENVIRONMENTAL HEALTH DIV.
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Tacoma - Pierce County
Health Department
Healthy People in Healthy Communities

www.tpchd.org

No. 1843b

WASTE DISPOSAL AUTHORIZATION

Tacoma Pierce County
Health Department

() Non-Asbestos

() New

() Asbestos (PSCAA Case # _____)

(XX) Amendment

1/25/2016 1:43:53 PM

Clerk 6-T1

Waste Disposal Auth Renew/Mod
\$85.00

Receipt #406170

ck# 207070 Port of Tacoma

- A. Generator Name: Port of Tacoma - Pier 4
- B. Generator Address: 1101 Port of Tacoma Road, Pier 4, Tacoma, WA
- C. Transporter Name: To Be Determined
- D. Technical Contact: Scott Hooten, Port of Tacoma Phone: (253)383-9428
- E. Waste Description: Contaminated Dredge Sediments - Port of Tacoma Pier 4 on the Blair Waterway
() Sludge (XX) Solid () PCS (XX) Other
- F. Approved Quantity: Additional 11000 Tons for a Project Total 110,000 Tons
- G. Actual Quantity (Filled in upon disposal): _____
- H. Multiple Loads: (XX) Yes () No
- I. Dates of Disposal: December 18, 2015 through May 31, 2016
- J. Testing: LPAH, HPAH, Dioxins/Furans, Pesticides, Metals (including Tributyltin), PCB's, Phenols, VOC's
- K. Reviewed by Department of Ecology: () Yes (XX) No
- L. Disposal/Transportation Requirements: A copy of this WDA must be transported with EACH load of waste and presented to the LRI Landfill Scalehouse Operator. These sediments qualify for management as a Special Waste per WAC 173-303-073, Conditional Exclusion of Special Wastes. As such, sediments are suitable for disposal in a MSWLF permitted in accordance with Chapter 173-351 WAC. Sediments are currently authorized for disposal only, unless LRI can demonstrate to the satisfaction of the TPCHD that the sediments physical characteristics are suitable for use as an ADC. Sediments shall be sufficiently dewatered such that they pass the Paint Filter Test prior to transport. In the event that liquids separate during transportation, the trucks must contain 100% of the liquids within the transportation vehicle. No leakage or spillage during transportation is acceptable and may result in revocation of this WDA. Load sizes shall comply with conditional-use and solid waste permit criteria.
- M. Facility: (XX) LRI Landfill (304th Street LF), 30919 Meridian Street, Eatonville, WA

CERTIFICATION

I hereby certify that I have personally examined and am familiar with the information submitted in this document and any supporting material. Based on my inquiry of those individuals immediately responsible for obtaining the information, the information submitted is true, accurate and complete to the best of my knowledge and ability and that all known and suspected hazards have been disclosed. I agree that the generator and/or transporter will abide by all conditions specified in line (L) or any attachments thereto.

1/25/16

Date

ENV. PROGRAMS ANALYST

Title

[Signature]

Signature

AUTHORIZED BY:

APPROVED

JAN 19 2016

[Signature]
Keith Johnston, TPCHD

(253)798-6561

TACOMA-PIERCE COUNTY HEALTH DEPT.
ENVIRONMENTAL HEALTH DIV.
For Official Use Only

Cc: LRI LF Scalehouse via Fax - 253 875 7205

No. 1843C

Tacoma - Pierce County
Health Department
 Healthy People in Healthy Communities

www.tpchd.org

WASTE DISPOSAL AUTHORIZATION

Tacoma Pierce County
 Health Department

☐ Non-Asbestos☐ New☐ Asbestos (PSCAA Case # _____)☒ Amendment

2/18/2016 10:18:19 AM

Clerk 55-TB

Waste Disposal Auth Renew/Mod
 \$85.00

Receipt #409342

V161172 Stuart Currie

- A. Generator Name: Port of Tacoma – Pier 4
- B. Generator Address: 1101 Port of Tacoma Road, Pier 4, Tacoma, WA
- C. Transporter Name: To Be Determined
- D. Technical Contact: Scott Hooten, Port of Tacoma Phone: (253)383-9428
- E. Waste Description: Contaminated Dredge Sediments - Port of Tacoma Pier 4 on the Blair Waterway
☐ Sludge ☒ Solid ☐ PCS ☒ Other
- F. Approved Quantity: Additional 10000 Tons for a Project Total 120,000 Tons
- G. Actual Quantity (Filled in upon disposal): _____
- H. Multiple Loads: ☒ Yes ☐ No
- I. Dates of Disposal: December 18, 2015 through May 31, 2016
- J. Testing: LPAH, HPAH, Dioxins/Furans, Pesticides, Metals (including Tributyltin), PCB's, Phenols, VOC's
- K. Reviewed by Department of Ecology: ☐ Yes ☒ No
- L. Disposal/Transportation Requirements: A copy of this WDA must be transported with EACH load of waste and presented to the LRI Landfill Scalehouse Operator. These sediments qualify for management as a Special Waste per WAC 173-303-073, Conditional Exclusion of Special Wastes. As such, sediments are suitable for disposal in a MSWLF permitted in accordance with Chapter 173-351 WAC. Sediments are currently authorized for disposal only, unless LRI can demonstrate to the satisfaction of the TPCHD that the sediments physical characteristics are suitable for use as an ADC. Sediments shall be sufficiently dewatered such that they pass the Paint Filter Test prior to transport. In the event that liquids separate during transportation, the trucks must contain 100% of the liquids within the transportation vehicle. No leakage or spillage during transportation is acceptable and may result in revocation of this WDA. Load sizes shall comply with conditional-use and solid waste permit criteria.
- M. Facility: ☒ LRI Landfill (304th Street LF), 30919 Meridian Street, Eatonville, WA

CERTIFICATION

I hereby certify that I have personally examined and am familiar with the information submitted in this document and any supporting material. Based on my inquiry of those individuals immediately responsible for obtaining the information, the information submitted is true, accurate and complete to the best of my knowledge and ability and that all known and suspected hazards have been disclosed. I agree that the generator and/or transporter will abide by all conditions specified in line (L) or any attachments thereto.

2/18/16
 Date

ENV. PROGRAMS ANALYST
 Title

[Signature]
 Signature

AUTHORIZED BY:

APPROVED**FEB 17 2016**

[Signature]
 Keith Johnston, TPCHD

(253)798-6561

TACOMA-PIERCE COUNTY HEALTH DEPT.
ENVIRONMENTAL HEALTH DIV.
 For Official Use Only

Cc: LRI LF Scalehouse via Fax – 253 875 7205

Waste Disposal Authorization Application

We require the information below to determine if this waste is acceptable for disposal at the City of Tacoma Landfill, the LRI Landfill, the Wm Dickson Waller Road Landfill, or other permitted solid waste facilities. It is unlikely that you will be able to respond in the space provided. Feel free to modify the format or address the information on additional pages. Include all the information requested below and email, fax or mail to:

Date May 15, 2015	Email ehsolidwaste@tpchd.org
Site/Generator Name Port of Tacoma - Pier 4 demolition	Fax (253) 798-6498
Site Owner Name Port of Tacoma	Tacoma-Pierce County Health Department 3629 South D Street MS 1045 Waste Management Tacoma, WA 98418-6813
Describe Where Waste Originated (site address, physical location, company name, project name, etc.) Pier 4 Phase 1 Removal Action Project - 1101 Port of Tacoma Road, Tacoma, WA	
Transporter Name Rhine Demolition	
Technical Contact/Consultant Name Stuart Currie, Port of Tacoma	
Proposed Solid Waste Disposal/Treatment Facility LRI Landfill (304 th Street LF), 30919 Meridian Street, Eatonville, WA	
Describe the Site History (if applicable) Commercial pier built 1967 and modified in subsequent remodel in 1983. Ballast material was located beneath the crane rail that ran along the face of the pier; however, an on-dock rail line was also present in the past. Ballast is rock/crushed rock fines in between concrete deck of pier structure and asphalt surface. Ballast layer is less than 2 feet thick.	
Describe How Waste is Generated/Source of Waste Demolition of existing pier/dock structure. WDA is for disposal of ballast material (rock/crushed rock) only. Crane rail track/asphalt/concrete are being disposed of separately.	
Projected Quantity or Volume of Waste (tons or cubic yards generated per month, quarter, year, once, etc.) 2,800 cubic yards	
Describe the Sampling Method(s) and/or Submit Sampling Plan Samples were collected as single grab samples from either the top (0.5-1 ft bgs) or bottom (≥ 2 ft) layer of the ballast material - see the attached sampling figure for sample locations. For each top layer sample, multiple scoops of material were collected using a stainless steel hand trowel, mixed in a stainless steel bowl, and then placed in the appropriate sample container. For each bottom layer sample, a backhoe was used to excavate a trench in the material, then the sample was collected from the bottom of the trench using the same method as the top layer samples. Samples were submitted to SPECTRA Laboratories (Tacoma, WA) for analysis.	
Describe and Justify the Number of Samples per Volume of Waste A total of 14 samples were collected for analysis. Based on the estimated total excavation quantity (2,800 cy), a minimum of 12 samples were required per the TPCHD waste management program.	
Describe and Justify the Parameters Selected for Analysis Based on 5/12/15 discussion with TPCHD, parameters selected for analysis were NWTPH-Dx and RCRA 8 metals.	


Waste Disposal Authorization Application

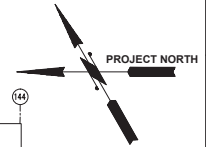


Please attach or enclose:

- analytical results
- chain of custody forms
- a sampling plan
- any other documents relevant to the review of the site, facility and/or waste being characterized

By my signature below, I certify that the information presented in this application is true and complete to the best of my knowledge.

Applicant Name Stuart Currie	Applicant Title Environmental Programs Analyst II
Applicant Signature 	Date May 15, 2015
Company Name Port of Tacoma	Company Address P.O. Box 1837, Tacoma, WA 98401-1837
Phone Number 253-428-8615	Fax Number
Email Address scurrie@portoftacoma.com	



CONFORMED SET ISSUED FOR CONSTRUCTION

<div>D2.1</div>		PIER 4 PHASE 1		APPROVED:		SEK	
SH 17 OF 54		REMOVAL ACTION PROJECT		CHECKED BY: DATE		2/6/15	
PIER DEMOLITION PLAN - SHEET 1				TAH		2/6/15	
				DIRECTOR		PROJ. ENC. DATE	
				PRINTED BY: annuma		Mar 23, 2015	
				PORT ADDRESS: ONE SIOUX PLAZA			
				TACOMA WA 98401-1837			





SPECTRA Laboratories

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05/07/2015


Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Stuart Currie

P.O.#: 68112
Project: Pier 4 Demo Ballast
Client ID: SP-1
Sample Matrix: Solid
Date Sampled: 05/05/2015
Date Received: 05/05/2015
Spectra Project: 2015050080
Spectra Number: 1
Rush

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Diesel	<10.0	mg/Kg	NWTPH-D
Oil	<50.0	mg/Kg	NWTPH-D
Total Arsenic	< 5	mg/Kg	SW846 6010C
Total Barium	25.4	mg/Kg	SW846 6010C
Total Cadmium	1.0	mg/Kg	SW846 6010C
Total Chromium	12.7	mg/Kg	SW846 6010C
Total Lead	< 5	mg/Kg	SW846 6010C
Total Selenium	< 5	mg/Kg	SW846 6010C
Total Silver	< 0.7	mg/Kg	SW846 6010C
Total Mercury	<0.05	mg/Kg	SW846 7471B

<u>Surrogate</u>	<u>% Recovery</u>	<u>Method</u>
p-Terphenyl	89	NWTPH-D

SPECTRA LABORATORIES



Steve Hibbs, Laboratory Manager
a5/jjb

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05/07/2015


Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Stuart Currie

P.O.#: 68112
Project: Pier 4 Demo Ballast
Client ID: SP-2
Sample Matrix: Solid
Date Sampled: 05/05/2015
Date Received: 05/05/2015
Spectra Project: 2015050080
Spectra Number: 2
Rush

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Diesel	<10.0	mg/Kg	NWTPH-D
Oil	58.8	mg/Kg	NWTPH-D
Total Arsenic	< 5	mg/Kg	SW846 6010C
Total Barium	29	mg/Kg	SW846 6010C
Total Cadmium	0.5	mg/Kg	SW846 6010C
Total Chromium	14.4	mg/Kg	SW846 6010C
Total Lead	< 4	mg/Kg	SW846 6010C
Total Selenium	< 5	mg/Kg	SW846 6010C
Total Silver	< 0.7	mg/Kg	SW846 6010C
Total Mercury	<0.05	mg/Kg	SW846 7471B

<u>Surrogate</u>	<u>% Recovery</u>	<u>Method</u>
p-Terphenyl	86	NWTPH-D

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Steve Hibbs, Laboratory Manager
a5/jjb



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05/07/2015


Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Stuart Currie

P.O.#: 68112
Project: Pier 4 Demo Ballast
Client ID: SP-3
Sample Matrix: Solid
Date Sampled: 05/05/2015
Date Received: 05/05/2015
Spectra Project: 2015050080
Spectra Number: 3
Rush

Analyte	Result	Units	Method
Diesel	<10.0	mg/Kg	NWTPH-D
Oil	178	mg/Kg	NWTPH-D
Total Arsenic	< 5	mg/Kg	SW846 6010C
Total Barium	40.6	mg/Kg	SW846 6010C
Total Cadmium	< 0.3	mg/Kg	SW846 6010C
Total Chromium	14	mg/Kg	SW846 6010C
Total Lead	10	mg/Kg	SW846 6010C
Total Selenium	< 5	mg/Kg	SW846 6010C
Total Silver	< 0.7	mg/Kg	SW846 6010C
Total Mercury	<0.05	mg/Kg	SW846 7471B

Surrogate	% Recovery	Method
p-Terphenyl	106	NWTPH-D

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05/07/2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Stuart Currie

P.O.#: 68112
Project: Pier 4 Demo Ballast
Client ID: SP-4
Sample Matrix: Solid
Date Sampled: 05/05/2015
Date Received: 05/05/2015
Spectra Project: 2015050080
Spectra Number: 4
Rush

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Diesel	<10.0	mg/Kg	NWTPH-D
Oil	<50.0	mg/Kg	NWTPH-D
Total Arsenic	< 5	mg/Kg	SW846 6010C
Total Barium	39.5	mg/Kg	SW846 6010C
Total Cadmium	0.3	mg/Kg	SW846 6010C
Total Chromium	12.1	mg/Kg	SW846 6010C
Total Lead	< 4	mg/Kg	SW846 6010C
Total Selenium	< 5	mg/Kg	SW846 6010C
Total Silver	< 0.7	mg/Kg	SW846 6010C
Total Mercury	<0.05	mg/Kg	SW846 7471B

<u>Surrogate</u>	<u>% Recovery</u>	<u>Method</u>
p-Terphenyl	79	NWTPH-D

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Steve Hibbs, Laboratory Manager
a5/ijb

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05/07/2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Stuart Currie

P.O.#: 68112
Project: Pier 4 Demo Ballast
Client ID: SP-5
Sample Matrix: Solid
Date Sampled: 05/05/2015
Date Received: 05/05/2015
Spectra Project: 2015050080
Spectra Number: 5
Rush

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Diesel	<10.0	mg/Kg	NWTPH-D
Oil	154	mg/Kg	NWTPH-D
Total Arsenic	< 5	mg/Kg	SW846 6010C
Total Barium	49	mg/Kg	SW846 6010C
Total Cadmium	0.3	mg/Kg	SW846 6010C
Total Chromium	11.7	mg/Kg	SW846 6010C
Total Lead	14	mg/Kg	SW846 6010C
Total Selenium	< 5	mg/Kg	SW846 6010C
Total Silver	< 0.7	mg/Kg	SW846 6010C
Total Mercury	<0.05	mg/Kg	SW846 7471B

Surrogate	% Recovery	Method
p-Terphenyl	77	NWTPH-D

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05/07/2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Stuart Currie

P.O.#: 68112
Project: Pier 4 Demo Ballast
Client ID: SP-6
Sample Matrix: Solid
Date Sampled: 05/05/2015
Date Received: 05/05/2015
Spectra Project: 2015050080
Spectra Number: 6
Rush

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Diesel	<50.0	mg/Kg	NWTPH-D
Oil	934	mg/Kg	NWTPH-D
Total Arsenic	9	mg/Kg	SW846 6010C
Total Barium	47.3	mg/Kg	SW846 6010C
Total Cadmium	2.8	mg/Kg	SW846 6010C
Total Chromium	23.6	mg/Kg	SW846 6010C
Total Lead	194	mg/Kg	SW846 6010C
Total Selenium	< 5	mg/Kg	SW846 6010C
Total Silver	< 0.7	mg/Kg	SW846 6010C
Total Mercury	0.07	mg/Kg	SW846 7471B

<u>Surrogate</u>	<u>% Recovery</u>	<u>Method</u>
p-Terphenyl	82	NWTPH-D

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a5/jjb



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5/6/2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401

Units: mg/L
Spectra Project: 2015050080
Applies to Spectra #'s 1-6

QUALITY CONTROL RESULTS

ICP Metals SW846 6010C - Soil/Solid

Method Blank

Date Digested: 5/6/2015

Date Analyzed: 5/6/2015

Element	Blank Result
Arsenic	< 0.05
Barium	< 0.002
Cadmium	< 0.003
Chromium	< 0.007
Lead	< 0.04
Selenium	< 0.05
Silver	< 0.007

Laboratory Control Sample (LCS)

Date Digested: 5/6/2015

Date Analyzed: 5/6/2015

Element	Spike Added	LCS Conc.	LCS %Rec
Arsenic	2.0	2.179	109.0
Barium	2.0	1.987	99.4
Cadmium	2.0	1.948	97.4
Chromium	2.0	1.983	99.2
Lead	2.0	1.938	96.9
Selenium	2.0	1.759	88.0
Silver	2.0	1.884	94.2

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 5/6/2015

Date Analyzed: 5/6/2015

Sample Spiked: 2015050080-1

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Arsenic	0.000	2.0	2.310	115.5	2.327	116.4	0.7
Barium	0.509	2.0	2.804	114.8	2.779	113.5	1.1
Cadmium	0.021	2.0	2.082	103.1	2.083	103.1	0.0
Chromium	0.254	2.0	2.418	108.2	2.382	106.4	1.7
Lead	0.000	2.0	2.009	100.5	1.981	99.1	1.4
Selenium	0.000	2.0	1.838	91.9	1.830	91.5	0.4
Silver	0.000	2.0	1.919	96.0	1.907	95.4	0.6

Recovery Limits 75-125%

RPD Limit 20

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Steven G. Hibbs
Laboratory Manager



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May 6, 2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401

Method: SW846 7471B
Spectra Project: 2015050080
Applies to Spectra # 1-6
Sample Matrix: Solid

MERCURY QUALITY CONTROL RESULTS

MS/MSD							
Units:	mg/Kg						Date Analyzed: 5/6/15
<u>Spike Sample</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>MS Result</u>	<u>% Recovery</u>	<u>MSD Result</u>	<u>% Recovery</u>	<u>RPD</u>
2015050080-6	0.068	0.4000	0.416	87.0	0.414	93.0	6.7
Recovery Limits: 75-125%				RPD Limit: <20			

BLANK SPIKE (LCS)				
Units	mg/Kg			Date Analyzed: 4/30/15
		Spike		
	Sample	Amount	MS	%
<u>Spike Sample</u>	<u>Result</u>	<u>Added</u>	<u>Result</u>	<u>Recovery</u>
LCS	<0.05	0.5000	0.479	95.8
Recovery Limit: 80-100%				

METHOD BLANK

Units:	mg/Kg						Date Analyzed: 4/30/15
Mercury	<0.05						

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Steve Hibbs, Laboratory Manager



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May 7, 2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401

Method: NWTPH-Dx
Sample Matrix: Soil
Spectra Project: 2015050080
Applies to Spectra #: 1-6
Units: mg/Kg


HYDROCARBON ANALYSIS QUALITY CONTROL RESULTS

MS/MSD							
Spiked Sample:	040422-1				Date Extracted:	4/20/2015	
					Date Analyzed:	4/21/2015	
<u>Compound</u>	<u>Sample Result</u>	Spike	Spike	<u>Percent Recovery</u>	Dup. Spike	<u>Percent Recovery</u>	<u>% RPD</u>
		<u>Amount Added</u>	<u>Amount Found</u>		<u>Amount Found</u>		
Diesel	<10.0	125	77	62	70	56	9.3

BLANK SPIKE (LCS)				
Date Extracted:	5/6/2015			Date Analyzed: 5/6/2015
<u>Compound</u>	<u>Sample Result</u>	Spike		<u>Percent Recovery</u>
		<u>Amount Added</u>	<u>Amount Found</u>	
Diesel	<10.0	125	105.9	84.72

METHOD BLANK			
Date Extracted:	5/6/2015	Date Analyzed:	5/6/2015
WTPH-D	<10.0		
Heavy Oils	<50.0		
Surrogate Percent Recoveries:			
	p-terphenyl	87%	

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Steven G. Hibbs, Laboratory Manager

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(253) 272-4850 Fax (253) 572-9838
www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:

Archive 1 jar/sample for possible
composite and additional analysis ✓

CHAIN OF CUSTODY

SPECTRA PROJECT #

2015050080

Return Samples: Y N

Page 1 of 1

STANDARD ☐

RUSH ☒

CLIENT: Port of Tacoma

ADDRESS:

ADDRESS

CHANGE ☐

PROJECT: Pier 4 Demo Ballast

CONTACT: Stuart Currie

SAMPLED BY: SC/JS

PHONE: 253-428-8615 FAX:

e-MAIL: scurrie@portoftacoma.com Prefer FAX ☐ or e-MAIL ☒

PURCHASE ORDER # 68112

NUMBER OF CONTAINERS

HYDROCARBONS

ORGANICS

METALS

OTHER

NWTPH-HCID

BTEX

BTEX/NWTPH-G

NWTPH-G

NWTPH-DX

1664 SGT-HEM (TPH)

1664 HEM (FOG)

8260/624 VOA

8260 CHLOR SOLVENTS

8270-625 SEMI VOA

8270 PAH/PNA

8082/608 PCB

TOTAL METALS RCRA 8

TOTAL METALS (SPECIFY)

TCLP METALS RCRA 8

TCLP METALS (SPECIFY)

PH 9040/9045

TX/TOX/EOX

TURBIDITY

FLASH POINT

BOD

SOLIDS (SPECIFY)

Archive

SAMPLE ID

DATE SAMPLED

TIME SAMPLED

MATRIX

1	SP-1	5/5/15	1046	S	2
2	SP-2		1050	S	2
3	SP-3		1106	S	2
4	SP-4		1153	S	2
5	SP-5		1201	S	2
6	SP-6		1135	S	2
7					
8					
9					
10					

LAB USE ONLY

SIGNATURE

PRINTED NAME

COMPANY

DATE

TIME

Shipped Via: US Mail UPS Fed Ex Courier Client

Shipping Container: Cooler Box Envelope None

Tracking #

Custody Seals: Y N Intact: Y N

Cooler Temp. Sample Temp.

RELINQUISHED BY

RECEIVED BY

RELINQUISHED BY

RECEIVED BY

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2% per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Laboratories, LLC



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05/12/2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Stuart Currie


P.O.#: 68112
Project: Pier 4 Ballast
Client ID: SP-3A
Sample Matrix: Solid
Date Sampled: 05/08/2015
Date Received: 05/08/2015
Spectra Project: 2015050167
Spectra Number: 1
Rush

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Diesel	<100	mg/Kg	NWTPH-D
Oil	5450	mg/Kg	NWTPH-D

*Surrogate diluted out of sample.

<u>Surrogate</u>	<u>Recovery</u>	<u>Method</u>
p-Terphenyl	0*	NWTPH-D

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Steve Hibbs, Laboratory Manager
a6/jjb



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05/12/2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Stuart Currie


P.O.#: 68112
Project: Pier 4 Ballast
Client ID: SP-3B
Sample Matrix: Solid
Date Sampled: 05/08/2015
Date Received: 05/08/2015
Spectra Project: 2015050167
Spectra Number: 2
Rush

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Diesel	<100	mg/Kg	NWTPH-D
Oil	5560	mg/Kg	NWTPH-D

*Surrogate diluted out of sample.

<u>Surrogate</u>	<u>Recovery</u>	<u>Method</u>
p-Terphenyl	0*	NWTPH-D

SPECTRA LABORATORIES


Steve Hibbs, Laboratory Manager
a6/jjb



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05/12/2015


Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Stuart Currie

P.O.#: 68112
Project: Pier 4 Ballast
Client ID: SP-4A
Sample Matrix: Solid
Date Sampled: 05/08/2015
Date Received: 05/08/2015
Spectra Project: 2015050167
Spectra Number: 3
Rush

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Diesel	<50.0	mg/Kg	NWTPH-D
Oil	454	mg/Kg	NWTPH-D

<u>Surrogate</u>	<u>Recovery</u>	<u>Method</u>
p-Terphenyl	77	NWTPH-D

SPECTRA LABORATORIES



Steve Hibbs, Laboratory Manager
a6/jjb



SPECTRA Laboratories

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May 12, 2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401

Method: NWTPH-Dx
Sample Matrix: Soil
Spectra Project: 2015050167
Applies to Spectra #: 1-3
Units: mg/Kg

HYDROCARBON ANALYSIS QUALITY CONTROL RESULTS

MS/MSD							
Spiked Sample:	050156-2				Date Extracted:	5/8/2015	
					Date Analyzed:	5/8/2015	
					Dup.		
	Sample	Spike	Spike	Percent	Spike	Percent	%
<u>Compound</u>	<u>Result</u>	<u>Amount</u>	<u>Amount</u>	<u>Recovery</u>	<u>Amount</u>	<u>Recovery</u>	<u>RPD</u>
		<u>Added</u>	<u>Found</u>		<u>Found</u>		
Diesel	<10.0	125	85	68	86	69	1.2

BLANK SPIKE (LCS)				
Date Extracted:	5/11/2015			Date Analyzed:
				5/12/2015
<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>
Diesel	<10.0	125	101.7	81.36

METHOD BLANK			
Date Extracted:	5/11/2015	Date Analyzed:	5/12/2015
WTPH-D	<10.0		
Heavy Oils	<50.0		
Surrogate Percent Recoveries:			
	p-terphenyl	101%	

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05/14/2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Stuart Currie

P.O.#: 68112
Project: Pier 4 Ballast
Client ID: SP-7
Sample Matrix: Solid
Date Sampled: 05/12/2015
Date Received: 05/12/2015
Spectra Project: 2015050282
Spectra Number: 1

Rush

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Diesel	135*	mg/Kg	NWTPH-D
Oil	2720	mg/Kg	NWTPH-D
Total Arsenic	19	mg/Kg	SW846 6010C
Total Barium	53.2	mg/Kg	SW846 6010C
Total Cadmium	22.6	mg/Kg	SW846 6010C
Total Chromium	20	mg/Kg	SW846 6010C
Total Lead	469	mg/Kg	SW846 6010C
Total Selenium	< 5	mg/Kg	SW846 6010C
Total Silver	< 0.7	mg/Kg	SW846 6010C
Hexavalent Chromium	< 1	mg/Kg	SW846 7196A
Total Mercury	< 0.05	mg/Kg	SW846 7471B

*Sample contains diesel range organics. **Surrogate diluted out of sample.

Surrogate	% Recovery	Method
p-Terphenyl	0**	NWTPH-D

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05/14/2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Stuart Currie


P.O.#: 68112
Project: Pier 4 Ballast
Client ID: SP-8
Sample Matrix: Solid
Date Sampled: 05/12/2015
Date Received: 05/12/2015
Spectra Project: 2015050282
Spectra Number: 2

Rush

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Diesel	<10.0	mg/Kg	NWTPH-D
Oil	<50.0	mg/Kg	NWTPH-D
Total Arsenic	< 5	mg/Kg	SW846 6010C
Total Barium	56.4	mg/Kg	SW846 6010C
Total Cadmium	0.6	mg/Kg	SW846 6010C
Total Chromium	16.2	mg/Kg	SW846 6010C
Total Lead	13	mg/Kg	SW846 6010C
Total Selenium	< 5	mg/Kg	SW846 6010C
Total Silver	< 0.7	mg/Kg	SW846 6010C
Hexavalent Chromium	< 1	mg/Kg	SW846 7196A
Total Mercury	< 0.05	mg/Kg	SW846 7471B

Surrogate	% Recovery	Method
p-Terphenyl	109	NWTPH-D

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05/14/2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Stuart Currie

P.O.#: 68112
Project: Pier 4 Ballast
Client ID: SP-9
Sample Matrix: Solid
Date Sampled: 05/12/2015
Date Received: 05/12/2015
Spectra Project: 2015050282
Spectra Number: 3


Rush

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Creosote	300	mg/Kg	NWTPH-D
Diesel	*	mg/Kg	NWTPH-D
Oil	*	mg/Kg	NWTPH-D
Total Arsenic	< 5	mg/Kg	SW846 6010C
Total Barium	32.5	mg/Kg	SW846 6010C
Total Cadmium	0.5	mg/Kg	SW846 6010C
Total Chromium	14.4	mg/Kg	SW846 6010C
Total Lead	40	mg/Kg	SW846 6010C
Total Selenium	< 5	mg/Kg	SW846 6010C
Total Silver	< 0.7	mg/Kg	SW846 6010C
Hexavalent Chromium	< 1	mg/Kg	SW846 7196A
Total Mercury	< 0.05	mg/Kg	SW846 7471B

*Sample appears to contain weathered creosote.

Surrogate	% Recovery	Method
p-Terphenyl	104	NWTPH-D

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05/14/2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Stuart Currie

P.O.#: 68112
Project: Pier 4 Ballast
Client ID: SP-10
Sample Matrix: Solid
Date Sampled: 05/12/2015
Date Received: 05/12/2015
Spectra Project: 2015050282
Spectra Number: 4
Rush

Analyte	Result	Units	Method
Diesel	<200	mg/Kg	NWTPH-D
Oil	1790	mg/Kg	NWTPH-D
Total Arsenic	< 5	mg/Kg	SW846 6010C
Total Barium	55.2	mg/Kg	SW846 6010C
Total Cadmium	3.6	mg/Kg	SW846 6010C
Total Chromium	21.6	mg/Kg	SW846 6010C
Total Lead	189	mg/Kg	SW846 6010C
Total Selenium	< 5	mg/Kg	SW846 6010C
Total Silver	< 0.7	mg/Kg	SW846 6010C
Hexavalent Chromium	< 1	mg/Kg	SW846 7196A
Total Mercury	< 0.05	mg/Kg	SW846 7471B

**Surrogate diluted out of sample.

Surrogate	% Recovery	Method
p-Terphenyl	0**	NWTPH-D

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05/14/2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Stuart Currie

P.O.#: 68112
Project: Pier 4 Ballast
Client ID: SP-11
Sample Matrix: Solid
Date Sampled: 05/12/2015
Date Received: 05/12/2015
Spectra Project: 2015050282
Spectra Number: 5

Rush

Analyte	Result	Units	Method
Creosote	1200	mg/Kg	NWTPH-D
Diesel	*	mg/Kg	NWTPH-D
Oil	*	mg/Kg	NWTPH-D
Total Arsenic	< 5	mg/Kg	SW846 6010C
Total Barium	98.1	mg/Kg	SW846 6010C
Total Cadmium	1.0	mg/Kg	SW846 6010C
Total Chromium	30.6	mg/Kg	SW846 6010C
Total Lead	134	mg/Kg	SW846 6010C
Total Selenium	< 5	mg/Kg	SW846 6010C
Total Silver	< 0.7	mg/Kg	SW846 6010C
Hexavalent Chromium	< 1	mg/Kg	SW846 7196A
Total Mercury	< 0.05	mg/Kg	SW846 7471B

*Sample appears to contain weathered creosote. **Surrogate diluted out of sample.

Surrogate	% Recovery	Method
p-Terphenyl	0**	NWTPH-D

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5/13/2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401

Units: ug/L
Spectra Project: 2015020282
Applies to Spectra #'s 1-5

QUALITY CONTROL RESULTS

Mercury Cold Vapor Soil/Solid - SW846 7471B

Method Blank

Date Digested: 5/13/2015 Date Analyzed: 5/13/2015

Element	Result
Mercury	< 0.5

Blank Spike (LCS)

Date Digested: 5/13/2015 Date Analyzed: 5/13/2015

Element	Spike Added	LCS Conc.	LCS %Rec
Mercury	5.0	5.630	112.6

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)


Date Digested: 5/12/2015 Date Analyzed: 5/12/2015
Sample Spiked: 2015050231-7

Element	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc	MSD %Rec	RPD
Mercury	0.000	2.0	1.940	97.0	1.900	95.0	2.1

Recovery Limits 80-120%

RPD Limit 20

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Laboratory Manager

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5/13/2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401

Units: mg/L
Spectra Project: 2015050282
Applies to Spectra #'s 1-5

QUALITY CONTROL RESULTS

ICP Metals SW846 6010C - Soil/Solid

Method Blank

Date Digested: 5/13/2015

Date Analyzed: 5/13/2015

Element	Blank Result
Arsenic	< 0.05
Barium	< 0.002
Cadmium	< 0.003
Chromium	< 0.007
Lead	< 0.04
Selenium	< 0.05
Silver	< 0.007

Laboratory Control Sample (LCS)

Date Digested: 5/13/2015

Date Analyzed: 5/13/2015

Element	Spike	LCS	LCS
	Added	Conc.	%Rec
Arsenic	2.0	1.966	98.3
Barium	2.0	1.936	96.8
Cadmium	2.0	1.831	91.6
Chromium	2.0	1.939	97.0
Lead	2.0	1.910	95.5
Selenium	2.0	2.056	102.8
Silver	2.0	1.769	88.5

LCS Recovery limits 80-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 5/11/2015

Date Analyzed: 5/11/2015


Sample Spiked: 2015050156-1

Element	Sample	Spike	MS	MS	MSD	MSD	RPD
	Conc.	Conc.	Conc.	%Rec	Conc	%Rec	
Arsenic	0.000	2.0	1.885	94.3	1.915	95.8	1.6
Barium	2.368	2.0	4.191	91.2	4.204	91.8	0.7
Cadmium	0.000	2.0	1.841	92.1	1.880	94.0	2.1
Chromium	0.418	2.0	2.166	87.4	2.227	90.5	3.4
Lead	0.069	2.0	1.894	91.3	1.914	92.3	1.1
Selenium	0.000	2.0	1.982	99.1	1.911	95.6	3.6
Silver	0.000	2.0	1.686	84.3	1.721	86.1	2.1

Recovery Limits 75-125%

RPD Limit 20

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5/14/2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401

Units: mg/L
Spectra Project: 2015050282
Applies to Spectra # 1 thru 5

QUALITY CONTROL RESULTS

Hexavalent Chromium in Soil/Solid - Method SM 3500 Cr-D/ SW846 7196A

Method Blank

Date Digested: 5/14/2015

Date Analyzed: 5/14/2015

	Result
Hexavalent Chromium	< 0.01

Blank Spike (LCS)

Date Digested: 5/14/2015

Date Analyzed: 5/14/2015

	Spike Added	LCS Conc.	LCS %Rec
Hexavalent Chromium	0.1	0.106	106.0

LCS Recovery limits 75-120%

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 5/14/2015

Date Analyzed: 5/14/2015

Sample Spiked: 2015050282-1

	Sample Conc.	Spike Conc.	MS Conc.	MS %Rec	MSD Conc.	MSD %Rec	RPD
Hexavalent Chromium	0.000	0.1	0.080	80.0	0.082	82.0	2.5

Recovery Limits 75-125%

RPD Limit 20

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Laboratory Manager



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May 14, 2015

Port of Tacoma
PO Box 1837
Tacoma, WA 98401

Method: NWTPH-Dx
Sample Matrix: Soil
Spectra Project: 2015050282
Applies to Spectra #: 1-5
Units: mg/Kg

HYDROCARBON ANALYSIS QUALITY CONTROL RESULTS

MS/MSD

Spiked Sample:	050156-2		Date Extracted:	5/8/2015			
			Date Analyzed:	5/8/2015			
					Dup.		
		Spike	Spike		Spike		
	Sample	Amount	Amount	Percent	Amount	Percent	%
<u>Compound</u>	<u>Result</u>	<u>Added</u>	<u>Found</u>	<u>Recovery</u>	<u>Found</u>	<u>Recovery</u>	<u>RPD</u>
Diesel	<10.0	125	85	68	86	69	1.2

BLANK SPIKE (LCS)

Date Extracted:	5/13/2015		Date Analyzed:	5/13/2015	
	Sample	Spike	Spike	Percent	
<u>Compound</u>	<u>Result</u>	<u>Amount Added</u>	<u>Amount Found</u>	<u>Recovery</u>	
Diesel	<10.0	125	83.5	66.8	

METHOD BLANK

Date Extracted:	5/13/2015	Date Analyzed:	5/13/2015
WTPH-D	<10.0		
Heavy Oils	<50.0		

Surrogate Percent Recoveries:

p-terphenyl 103%

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www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:

Possible hydrocarbons in sample

CHAIN OF CUSTODY

SPECTRA PROJECT #

2015050282

Return Samples: Y N

Page ____ of ____

STANDARD ☐

RUSH ☒

CLIENT: Port of Tacoma

ADDRESS:

ADDRESS
CHANGE ☐

PROJECT: Pier 4 Ballast

CONTACT: Stuart Currie

SAMPLED BY: SC

PHONE: 253-428-8615 FAX:

e-MAIL: scurrie@portoftacoma.com Prefer FAX ☐
or e-MAIL ☐

PURCHASE ORDER # 68112

NUMBER OF CONTAINERS	HYDROCARBONS						ORGANICS				METALS				OTHER								
	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA	8260 CHLOR SOLVENTS	8270-625 SEMI VOA	8270 PAH/PNA	8082/608 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	Hexavalent Chromium	PH 9040/9045	TX/TOX/EOX	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)
1					X									X			X						
2					X									X			X						
3					X									X			X						
4					X									X			X						
5					X									X			X						
6																							
7																							
8																							
9																							
10																							

LAB USE ONLY

Shipped Via:
US Mail UPS Fed Ex Courier Client

Shipping Container:
Cooler Box Envelope None

Tracking #

Custody Seals: Y N Intact: Y N

Cooler Temp. Sample Temp.

SIGNATURE

PRINTED NAME

COMPANY

DATE

TIME

RELINQUISHED BY

RECEIVED BY

RELINQUISHED BY

RECEIVED BY

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2% per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Laboratories, LLC



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12/08/2015

Clean Harbors
26328 79th Ave S
Kent, WA 98032

P.O.#: W150640540
Project: Port of Tacoma
Client ID: 1503661754
Sample Matrix: Oil/Sludge
Date Sampled: 11/16/2015
Date Received: 11/16/2015
Spectra Project: 2015110434
Spectra Number: 1

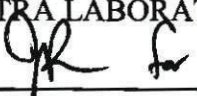
Analyte	Result	Units	Method	Analyte	Result	Units	Method
Subcontract	*			TCLP 1,1-Dichloroethene	<0.05	mg/L	SW846 8260C
Flashpoint (PMCC)	>210	°F	ASTM D-93	TCLP 1,2-Dichloroethane	<0.05	mg/L	SW846 8260C
TCLP Arsenic	< 0.05	mg/L	SW846 6010C	TCLP 2-Butanone (MEK)	<0.50	mg/L	SW846 8260C
TCLP Barium	0.054	mg/L	SW846 6010C	TCLP Benzene	<0.05	mg/L	SW846 8260C
TCLP Cadmium	< 0.003	mg/L	SW846 6010C	TCLP Carbon Tetrachloride	<0.05	mg/L	SW846 8260C
TCLP Chromium	< 0.007	mg/L	SW846 6010C	TCLP Chlorobenzene	<0.05	mg/L	SW846 8260C
TCLP Lead	< 0.04	mg/L	SW846 6010C	TCLP Chloroform	<0.05	mg/L	SW846 8260C
TCLP Selenium	< 0.05	mg/L	SW846 6010C	TCLP Tetrachloroethene	<0.05	mg/L	SW846 8260C
TCLP Silver	< 0.007	mg/L	SW846 6010C	TCLP Trichloroethene	<0.05	mg/L	SW846 8260C
TCLP Mercury	<0.002	mg/L	SW846 7470A	TCLP Vinyl chloride	<0.05	mg/L	SW846 8260C
TCLP Cis-Chlordane	<0.0001	mg/L	SW846 8081B	TCLP 1,4-Dichlorobenzene	<0.025	mg/L	SW846 8270D
TCLP Endrin	<0.0001	mg/L	SW846 8081B	TCLP 2,4,-D	<0.50	mg/L	SW846 8270D
TCLP Heptachlor	<0.0001	mg/L	SW846 8081B	TCLP 2,4,5,-TP (Silvex)	<0.50	mg/L	SW846 8270D
TCLP Heptachlor Epoxide	<0.0001	mg/L	SW846 8081B	TCLP 2,4,5-Trichlorophenol	<0.025	mg/L	SW846 8270D
TCLP Lindane	<0.0001	mg/L	SW846 8081B	TCLP 2,4,6-Trichlorophenol	<0.025	mg/L	SW846 8270D
TCLP Methoxychlor	<0.0001	mg/L	SW846 8081B	TCLP 2,4-Dinitrotoluene	<0.025	mg/L	SW846 8270D
TCLP Toxaphene	<0.01	mg/L	SW846 8081B	TCLP 2-Methylphenol	<0.025	mg/L	SW846 8270D
TCLP Trans-Chlordane	<0.0001	mg/L	SW846 8081B	TCLP 3-Methylphenol	<0.025	mg/L	SW846 8270D
PCB AR1260	0.015	mg/Kg	SW846 8082A	TCLP 4-Methylphenol	<0.025	mg/L	SW846 8270D

*Sample subcontracted to ARI. Please see attached results.

Surrogate	Recovery	Method
Decachlorobiphenyl	80	SW846 8082A
Tetrachloro-M-Xylene	65	SW846 8081B
1,2-Dichloroethane-d4	98	SW846 8260C
Dibromofluoromethane	104	SW846 8260C
Toluene-d8	96	SW846 8260C
4-Bromofluorobenzene	105	SW846 8260C
Nitrobenzene-d6	55	SW846 8270D

Surrogate	Recovery	Method
2-Fluorobiphenyl	65	SW846 8270D
2,4,6-Tribromophenol	36	SW846 8270D
p-Terphenyl-d14	77	SW846 8270D
Phenol-d6	43	SW846 8270D
2-Fluorophenol	56	SW846 8270D

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Steve Hibbs, Laboratory Manager

a14cxsur/jjb

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12/08/2015

Clean Harbors
26328 79th Ave S
Kent, WA 98032

P.O.#: W150640540
Project: Port of Tacoma
Client ID: 1503661754
Sample Matrix: Oil/Sludge
Date Sampled: 11/16/2015
Date Received: 11/16/2015
Spectra Project: 2015110434
Spectra Number: 1

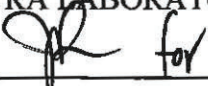
<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>	<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
TCLP Hexachlorobenzene	<0.025	mg/L	SW846 8270D				
TCLP Hexachlorobutadiene	<0.025	mg/L	SW846 8270D				
TCLP Hexachloroethane	<0.025	mg/L	SW846 8270D				
TCLP Nitrobenzene	<0.025	mg/L	SW846 8270D				
TCLP Pentachlorophenol	<0.025	mg/L	SW846 8270D				
TCLP Pyridine	<0.10	mg/L	SW846 8270D				
pH	5.31	pH	SW846 9045D				

*Sample subcontracted to ARI. Please see attached results.

Surrogate	Recovery	Method
Decachlorobiphenyl	80	SW846 8082A
Tetrachloro-M-Xylene	65	SW846 8081B
1,2-Dichloroethane-d4	98	SW846 8260C
Dibromofluoromethane	104	SW846 8260C
Toluene-d8	96	SW846 8260C
4-Bromofluorobenzene	105	SW846 8260C
Nitrobenzene-d6	55	SW846 8270D

Surrogate	Recovery	Method
2-Fluorobiphenyl	65	SW846 8270D
2,4,6-Tribromophenol	36	SW846 8270D
p-Terphenyl-d14	77	SW846 8270D
Phenol-d6	43	SW846 8270D
2-Fluorophenol	56	SW846 8270D

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Steve Hibbs, Laboratory Manager
a14exsur/jjb

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December 7, 2015

Clean Harbors
26328 79th Ave. S.
Kent, Wa 98032**METHOD BLANK**Sample Matrix: Water
Spectra Project: 2015110434
Applies to Spectra # 1Date Extracted: 11/24/2015
Date Analyzed: 11/25/2015
Dilution Factor: 1
< = less than

ORGANOCHLORINE PESTICIDES		Method SW846 8081B	
Compound	ug/L	Compound	ug/L
a-BHC	<0.01	Dieldrin	<0.01
g-BHC (lindane)	<0.01	Endrin	<0.01
b-BHC	<0.01	4,4'-DDD	<0.01
Heptachlor	<0.01	Endosulfan II	<0.01
d-BHC	<0.01	4,4'-DDT	<0.01
Aldrin	<0.01	Endrin aldehyde	<0.01
Hept Epoxide	<0.01	Endosulfan sulfate	<0.01
g-Chlordane	<0.01	Methoxchlor	<0.01
a-Chlordane	<0.01	Endrin ketone	<0.01
Endosulfan I	<0.01	Toxaphene	<1.0
4,4'-DDE	<0.01		

Surrogate Percent Recoveries

TCMX 72%
Decachlorobiphenyl 87%

SPECTRA LABORATORIES


Steve Hibbs, Laboratory Manager



SPECTRA Laboratories

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December 7, 2015

Clean Harbors
26328 79th Ave. S.
Kent, Wa 98032

Method: SW 846 8081B
Sample Matrix: Water
Units: ug/L
Spectra Project: 2015110434
Applies to Spectra # 1

ORGANOCHLORINE PESTICIDES ANALYSIS QUALITY CONTROL RESULTS (LCS)

LCS Results

Spiked Sample: Method Blank Date Extracted: 11/24/2015
Date Analyzed: 11/25/2015

Compound	Sample Result	Spike Amount Added	Spike Amount Found	Percent Recovery
g-BHC (lindane)	<0.01	0.10	0.08	77%
Heptachlor	<0.01	0.10	0.08	76%
Aldrin	<0.01	0.10	0.08	77%
Dieldrin	<0.01	0.25	0.21	86%
Endrin	<0.01	0.25	0.22	87%
4,4'-DDT	<0.01	0.25	0.22	87%

SPECTRA LABORATORIES



Steven G. Hibbs, Laboratory Manager

December 7, 2015

Clean Harbors
26328 79th Ave. S.
Kent, Wa 98032Method: SW846 8081B
Sample Matrix: Water
Units: ug/L
Spectra Project: 2015110434
Applies to Spectra # 1**ORGANOCHLORINE PESTICIDES ANALYSIS
QUALITY CONTROL RESULTS LCS-LCSD****LCS and LCS Duplicate**Spiked Sample: Method Blank
Date Extracted: 11/5/2015
Date Analyzed: 11/5/2015

Compound	Sample Result	Spike Amount	Spike Amount	Percent Recovery	Dup. Spike Amount	Percent	% RPD
		Added	Found		Found	Recovery	
g-BHC (lindane)	<0.01	0.100	0.075	75%	0.082	82%	9%
Heptachlor	<0.01	0.100	0.078	78%	0.086	86%	10%
Aldrin	<0.01	0.100	0.074	74%	0.082	82%	10%
Dieldrin	<0.01	0.250	0.197	79%	0.214	86%	8%
Endrin	<0.01	0.250	0.206	82%	0.225	90%	9%
4,4'-DDT	<0.01	0.250	0.202	81%	0.223	89%	10%

SPECTRA LABORATORIES



Steven G. Hibbs, Laboratory Manager

December 2, 2015

Clean Harbors
26328 79th Ave. S.
Kent, WA 98032

Spectra Project #	2015110434
Sample Spiked:	Method Blank
Date Extracted:	11/24/2015
Date Analyzed:	11/25/2015
Units:	ug/L
Applies to Spectra #'s:	#1

**GCMS Semi-Volatile Organic Analysis Method 625/8270
Blank Spike (LCS) Results**

Compound	Sample Conc.	Spike Added	MS Conc.	MS %Rec	Rec. Limits
Phenol	<2.50	75	27.7	37	32-84
2-Chlorophenol	<2.50	75	28.6	38	35-84
1,4-Dichlorobenzene	<2.50	50	17.0	34	15-90
N-Nitroso-Di-N-Propylamine	<2.50	50	40.5	81	31-104
1,2,4-Trichlorobenzene	<2.50	50	18.3	37	24-82
4-Chloro-3-Methylphenol	<2.50	75	33.3	44	34-107
Acenaphthene	<1.00	50	22.8	46	34-98
2,4-Dinitrotoluene	<2.50	50	18.1	36	32-105
4-Nitrophenol	<2.50	75	39.8	53	26-156
Pentachlorophenol	<2.50	75	24.4	33	34-101
Pyrene	<1.00	50	33.6	67	30-130

Surrogates	% Rec	Limits
2-Fluorophenol	60	33-77
Phenol-d5	46	34-122
Nitrobenzene-d5	52	32-122
2-Fluorobiphenyl	60	35-98
2,4,6-Tribromophenol	40	30-127
p-Terphenyl-d14	76	66-130


Steven G. Hibbs
Laboratory Manager



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December 2, 2015

Clean Harbors
26328 79th Ave. S.
Kent, WA 98032

METHOD BLANK

Sample Matrix: TCLP Extract
Spectra Project: 2015110434
Applies to Spectra # #1

Date Extracted: 11/24/2015
Date Analyzed: 11/25/2015
Dilution Factor: 10
< = less than

TCLP SEMI-VOLATILES LISTED COMPOUNDS BY METHOD 8270

<u>EPA HW No.</u>	<u>Compound</u>	<u>Result (mg/L)</u>
D-027	1,4- Dichlorobenze	<0.025
D-023	2-Methylphenol	<0.025
D-025	4-Methylphenol	<0.025
D-024	3-Methylphenol	<0.025
D-034	Hexachloroethane	<0.025
D-036	Nitrobenzene	<0.025
D-033	Hexachlorobutadiene	<0.025
D-042	2,4,6-Trichlorophenol	<0.025
D-041	2,4,5 Trichlorophenol	<0.025
D-030	2,4-Dinitrotoluene	<0.025
D-032	Hexachlorobenzene	<0.025
D-037	Pentachlorophenol	<0.025
D-038	Pyridine	<0.10
D-016	2,4-D	<0.50
D-017	2,4,5-TP (Silvex)	<0.50

Surrogate Percent Recoveries:

2-Fluorophenol	64%
Phenol-d5	38%
Nitrobenzene	52%
2-Fluorobiphenyl	63%
2,4,6-Tribromophenol	31%
p-Terphenyl-d14	89%

SPECTRA LABORATORIES



Steven G. Hibbs, Laboratory Manager

December 2, 2015

Clean Harbors
26328 79th Ave. S.
Kent, WA 98032Sample Matrix: TCLP Extract
EPA Method: 624/8260C
Spectra Project: 2015110434
Date Analyzed: 11/24/2015
Units: mg/L
Applies to Spectra #'s: #1
Spiked Sample 2015110434-1**GCMS VOLATILE ORGANIC ANALYSIS**
Matrix Spike/ Matrix Spike Duplicate Results

COMPOUND	SAMPLE RESULT	SPIKE AMOUNT	MS RESULT	MS %REC	MSD RESULT	MSD %REC	RPD
1,1-Dichloroethene	<1	10.0	7.17	72	8.32	83	14.8
Benzene	<1	10.0	8.23	82	8.51	85	3.3
Trichloroethene	<1	10.0	10.38	104	9.97	100	4.0
Toluene	<1	10.0	8.82	88	7.79	78	12.4
Chlorobenzene	<1	10.0	9.76	98	9.26	93	5.3
(Results after dilution)							

Surrogates	MS	MSD
Dibromofluoromethane	95	100
1,2-Dichloroethane-d4	100	89
Toluene-d8	94	78
4-Bromofluorobenzene	91	85


Steven G. Hibbs
Laboratory Manager



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December 2, 2015

Clean Harbors
26328 79th Ave. S.
Kent, WA 98032

METHOD BLANK

Sample Matrix: TCLP Extract
Spectra Project: 2015110434
Applies to Spectra # 1

Date Extracted: 11/23/2015
Date Analyzed: 11/24/2015
Dilution Factor: 50
< = less than

VOLATILE "D" LISTED COMPOUNDS

by EPA TCLP-ZHE Extraction Method 1311 and GCMS Analysis Method 8260

<u>EPA HW No.</u>	<u>Compound</u>	<u>Result (mg/L)</u>
D018	Benzene	<0.05
D019	Carbon Tetrachloride	<0.05
D021	Chlorobenzene	<0.05
D022	Chloroform	<0.05
D028	1,2-Dichloroethane	<0.05
D029	1,1-Dichloroethylene	<0.05
D035	Methyl Ethyl Ketone	<0.50
D039	Tetrachloroethylene	<0.05
D040	Trichloroethylene	<0.05
D043	Vinyl Chloride	<0.05

Surrogate Percent Recoveries:

Dibromofluoromethane	95%
1,2,-Dichloroethane-d4	96%
Toluene-d8	105%
Bromofluorobenzene	111%

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Steven G. Hibbs, Laboratory Manager



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11/19/2015

Clean Harbors
26328 79th Ave. S.
Kent, WA 98032

Units: mg/L
Spectra Project: 2015110434
Applies to Spectra #'s: 1
Analyst: SCJ

QUALITY CONTROL RESULTS

ICP Metals SW846 6010C - TCLP

Method Blank

Date Digested: 11/19/2015 Date Analyzed: 11/19/2015

Element	Blank Result
Arsenic	< 0.05
Barium	< 0.002
Cadmium	< 0.003
Chromium	< 0.007
Lead	< 0.04
Selenium	< 0.05
Silver	< 0.007

Laboratory Control Sample (LCS)

Date Digested: 11/19/2015 Date Analyzed: 11/19/2015

Element	Spike	LCS	LCS
	Added	Conc.	%Rec
Arsenic	1.0	1.045	104.5
Barium	1.0	1.053	105.3
Cadmium	1.0	1.053	105.3
Chromium	1.0	1.028	102.8
Lead	1.0	1.055	105.5
Selenium	1.0	1.049	104.9
Silver	1.0	1.026	102.6

LCS Recovery limits 80-120%


Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Date Digested: 11/16/2015 Date Analyzed: 11/16/2015
Sample Spiked: 2015110293-1

Element	Sample	Spike	MS	MS	MSD	MSD	RPD
	Conc.	Conc.	Conc.	%Rec	Conc.	%Rec	
Arsenic	0.106	1.0	1.045	93.9	1.062	95.6	1.8
Barium	0.131	1.0	1.089	95.8	1.096	96.5	0.7
Cadmium	0.020	1.0	1.045	102.5	1.044	102.4	0.1
Chromium	0.000	1.0	0.988	98.8	0.986	98.6	0.2
Lead	0.000	1.0	0.995	99.5	1.007	100.7	1.2
Selenium	0.000	1.0	1.175	117.5	1.168	116.8	0.6
Silver	0.000	1.0	1.003	100.3	1.060	106.0	5.5

Recovery Limits 75-125%

RPD Limit 20



Steven G. Hibbs
Laboratory Manager

November 19, 2015

Clean Harbors
19320 Des Moines Memorial Dr.
Seatac, WA 98148

Method: SW846 7470A
Spectra Project: 2015110434
Applies to Spectra #'s 1
Sample Matrix: TCLP Extract

MERCURY
QUALITY CONTROL RESULTS

Units:		mg/L		MS/MSD				Date Analyzed:	11/19/15
				Spike					
		Sample	Amount	MS	%	MSD	%		
<u>Spike Sample</u>		<u>Result</u>	<u>Added</u>	<u>Result</u>	<u>Recovery</u>	<u>Result</u>	<u>Recovery</u>	<u>RPD</u>	
2105110489-1		0.0000	0.0040	0.00412	103.0	0.00396	99.0	4.0	

Units		mg/L		BLANK SPIKE (LCS)				Date Analyzed:	11/19/15
				Spike					
		Sample	Amount	MS	%				
<u>Spike Sample</u>		<u>Result</u>	<u>Added</u>	<u>Result</u>	<u>Recovery</u>				
LCS		< 0.0002	0.0050	0.00504	100.8				

Recovery Limit: 80-120%

		METHOD BLANK							
Units:		mg/L				Date Analyzed:	11/19/15		
Mercury		< 0.0002							

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Steve Hibbs, Laboratory Manager



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December 7, 2015

Clean Harbors
26328 79th Ave S
Kent, WA 98032

Method: EPA Method 8082A
Sample Matrix: Solid
Units: mg/Kg
Spectra Project: 2015110434
Applies to Spectra # 1

PCB ANALYSIS QUALITY CONTROL RESULTS

MS/MSD							
Spiked Sample:	2015110190-4			Date Extracted:	11/24/2015		
				Date Analyzed:	11/24/2015		
<u>Compound</u>	<u>Sample Result</u>	<u>Spike Amount Added</u>	<u>Spike Amount Found</u>	<u>Percent Recovery</u>	<u>Dup. Spike Amount Found</u>	<u>Percent Recovery</u>	<u>RPD</u>
AR1260	<0.01	0.025	0.015	60%	0.019	76%	23.5

METHOD BLANK

Date Extracted: 11/23/2015 Date Analyzed: 11/25/2015

PCB's <0.01

Surrogate Recovery:

Decachlorobiphenyl 92%

SPECTRA LABORATORIES



Steven G. Hibbs, Laboratory Manager

TBT SURROGATE RECOVERY SUMMARY

Matrix: Sludge

QC Report No: ARA6-Spectra Laboratories

Project: 2015110434

Event: NA

Client ID	TPRT	TPNT	TOT OUT
MB-112415	48.5%	33.3%	0
LCS-112415	38.1%	29.6%*	1
LCSD-112415	49.0%	35.2%	0
2015110434-1	32.2%	26.8%*	1

QC LIMITS

(TPRT) = Tripropyl Tin Chloride

(30-160)

(TPNT) = Tripentyl Tin Chloride

(30-160)

Prep Method: SW3546

Analytical Method: TBT (Hexyl) 8270D-SIM

Log Number Range: 15-22222 to 15-22222

ORGANICS ANALYSIS DATA SHEET

Tributyl Tins by SW8270D-SIM GC/MS

Page 1 of 1

Sample ID: LCS-112415

LAB CONTROL SAMPLE

Lab Sample ID: LCS-112415

LIMS ID: 15-22222

Matrix: Sludge

Data Release Authorized: 

Reported: 12/04/15

QC Report No: ARA6-Spectra Laboratories

Project: 2015110434

Date Sampled: NA

Date Received: NA

Date Extracted LCS: 11/24/15

Sample Amount LCS: 5.00 g-dry-wt

LCSD: 5.00 g-dry-wt

Date Analyzed LCS: 11/25/15 14:36

Final Extract Volume LCS: 0.50 mL

LCSD: 11/25/15 14:48

LCSD: 0.50 mL

Instrument/Analyst LCS: NT12/JLW

Dilution Factor LCS: 1.00

LCSD: NT12/JLW

LCSD: 1.00

Silica Gel Cleanup: Yes

Alumina Cleanup: No

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Tributyltin Ion	16.5	44.6	37.0%	19.6	44.6	43.9%	17.2%

Reported in µg/kg (ppb)

RPD calculated using sample concentrations per SW846.

TBT Surrogate Recovery

	LCS	LCSD
Tripentyl Tin Chloride	38.1%	49.0%
Tripentyl Tin Chloride	29.6%	35.2%

ORGANICS ANALYSIS DATA SHEET
Tributyl Tins by SW8270D-SIM GC/MS
Extraction Method: SW3546
Page 1 of 1

Sample ID: MB-112415
METHOD BLANK

Lab Sample ID: MB-112415
LIMS ID: 15-22222
Matrix: Sludge
Data Release Authorized: *MM*
Reported: 12/04/15

QC Report No: ARA6-Spectra Laboratories
Project: 2015110434
Event: NA
Date Sampled: NA
Date Received: NA

Date Extracted: 11/24/15
Date Analyzed: 11/25/15 14:23
Instrument/Analyst: NT12/JLW
Silica Gel Cleanup: Yes

Sample Amount: 5.00 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Alumina Cleanup: No

CAS Number	Analyte	RL	Result	Q
36643-28-4	Tributyltin Ion	3.9	< 3.9	U

Reported in µg/kg (ppb)

TBT Surrogate Recovery

Tripropyl Tin Chloride	48.5%
Triphenyl Tin Chloride	33.3%

ORGANICS ANALYSIS DATA SHEET
Tributyl Tins by SW8270D-SIM GC/MS
Extraction Method: SW3546
Page 1 of 1

Sample ID: 2015110434-1
SAMPLE

Lab Sample ID: ARA6A
LIMS ID: 15-22222
Matrix: Sludge
Data Release Authorized: *WW*
Reported: 12/04/15

QC Report No: ARA6-Spectra Laboratories
Project: 2015110434
Event: NA
Date Sampled: 11/16/15
Date Received: 11/18/15

Date Extracted: 11/24/15
Date Analyzed: 11/25/15 15:14
Instrument/Analyst: NT12/JLW
Silica Gel Cleanup: Yes

Sample Amount: 5.36 g-dry-wt
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Alumina Cleanup: No
Moisture: 40.9%

CAS Number	Analyte	RL	Result	Q
36643-28-4	Tributyltin Ion	3.6	8.9	

Reported in µg/kg (ppb)

TBT Surrogate Recovery

Tripropyl Tin Chloride	32.2%
Triphenyl Tin Chloride	26.8%

SPECTRA Laboratories

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www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:

**See Attached Quote*

CHAIN OF CUSTODY

SPECTRA PROJECT #

2015110434

Return Samples: Y N

Page _____ of _____

STANDARD ☒

RUSH ☐

CLIENT: *Clean Harbors Environmental*

ADDRESS:

ADDRESS

CHANGE ☐

PROJECT: *Port of Tacoma*

CONTACT: *Lannie Louder*

SAMPLED BY: *Lannie*

PHONE: *206-496-8582* FAX:

e-MAIL: *louderlannie@cleanharbors.com* Prefer FAX ☐ or e-MAIL ☒

PURCHASE ORDER # *W150640540*

NUMBER OF CONTAINERS

HYDROCARBONS

ORGANICS

METALS

OTHER

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8260/624 VOA	8260 CHLOR SOLVENTS	8270-625 SEMI VOA	8270 PAH/PNA	8082/608 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX/EOX	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	Tributyltin (TBT)	Complete TCLP (VOA, Semi VOA, HAPs)
1 <i>1503661754</i>	<i>11/16/2015</i>	<i>15:20</i>		<i>1</i>											<i>X</i>					<i>X</i>		<i>X</i>			<i>X</i>	<i>X</i>	
2																											
3																											
4																											
5																											
6																											
7																											
8																											
9																											
10																											

LAB USE ONLY

SIGNATURE

PRINTED NAME

COMPANY

DATE

TIME

Shipped Via: US Mail UPS Fed Ex Courier Client

Shipping Container: Cooler Box Envelope None

Tracking # _____

Custody Seals: Y N Intact: Y N

Cooler Temp. _____ Sample Temp. _____

RELINQUISHED BY

RECEIVED BY

RELINQUISHED BY

RECEIVED BY

Doug Wade
Lannie Louder

Doug Wade
Lannie Louder

CHES
Spax

11/16/2015 *15:48*
11/16 *3:48*

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2% per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Laboratories, LLC

SPECTRA Laboratories

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(253) 272-4850 Fax (253) 572-9838

www.spectra-lab.com info@spectra-lab.com

SPECIAL INSTRUCTIONS/COMMENTS:

CHAIN of CUSTODY

SPECTRA PROJECT #

Return Samples Y N X Page 1 of 1

STANDARD

X

RUSH

CLIENT: Spectra Laboratories

ADDRESS: 2221 Ross Way Tacoma WA 98421

ADDRESS
CHANGE ☐

PROJECT: 2015110434

CONTACT: Marie H

SAMPLED BY:

PHONE: 253-272-4850 FAX: 253-572-9838

e-MAIL: marieH@spectra-lab.com

Prefer FAX ☐
or e-MAIL ☐

PURCHASE ORDER #:

NUMBER OF CONTAINERS

HYDROCARBONS						ORGANICS						METALS				OTHER																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM (TPH)	1664 HEM (FOG)	8280/624 VOA	8280 CHLOR SOLVENTS	8270/625 SEMI VOA	8270 PAH/PNA	8082/608 PCB	TOTAL METALS RCRA 8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	PH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																

LAB USE ONLY

SIGNATURE

PRINTED NAME

COMPANY

DATE

TIME

Shipped Via: US Mail UPS Fed Ex Courier Client

RELINQUISHED BY

Jen Draven

Jen Draven

Spectra

11/17/15

9:24 AM

Shipping Container:

Cooler Box Envelope None

RECEIVED BY

A. Volgardsen

A. Volgardsen

API

11/18/15

1255

RELINQUISHED BY

RECEIVED BY

Tracking #

Custody Seals: Y N Intact: Y N

Cooler Temp. Sample Temp.

Payment Terms: Net 30 days. Past due accounts subject to 1 1/2 % per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other costs of collection regardless of whether suit is filed in Pierce Co., WA venue. Spectra Analytical, Inc.

Pier 4
Phase 1 Removal Action
Time Critical Removal
Action Completion Report

Appendix C
Open-Water Sediment Disposal Final Site
Use Authorization and Clean Dredging
Report Package

**STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES
PETER GOLDMARK, Commissioner of Public Lands**

OPEN WATER DISPOSAL SITE USE AUTHORIZATION NO. 20-520039

The STATE OF WASHINGTON, acting by and through the Department of Natural Resources, hereinafter called State, does hereby permit the PORT OF TACOMA (Grantee), a Washington State Local Municipal Corporation, to use certain lands owned by the state of Washington situated in Pierce County and designated as follows:

That area encompassed within a 600 foot radius of a point which is 47° 18.21' North Latitude and 122° 27.91' West Longitude (1983 North American Datum), also known as the Commencement Bay non-dispersive VTS open water disposal site.

SECTION 1 TERMS

1.01 Term. This use authorization shall be effective on August 1, 2015, and will expire at 11:59 pm on February 15, 2016, or as otherwise specified herein.

1.02 Renewal. State may extend this use authorization upon whatever terms and conditions it may prescribe, providing an extension is in the public interest.

1.03 Cancellation. This use authorization may be suspended or terminated for violation of any of the terms stated in this use authorization or any amendments thereto or if such action is found to be in the public interest.

1.04 Termination. This use authorization shall terminate upon the expiration, cancellation, or suspension of State's shoreline permit authorizing the site. If State does obtain a renewed shoreline permit for said site, this use authorization may be reinstated upon terms then in effect, but shall include any additional application fees associated with increased costs for management of the site. This use authorization or reinstated use authorization will terminate upon the use authorization expiration date shown above.

SECTION 2 USE OF PREMISES

2.01 Permitted Use. Grantee shall have non-exclusive use of the premises only for the disposal of approved dredged material of a volume not to exceed 9,000 cubic yards, as authorized through a US EPA Time Critical Removal Action for Terminal 4-Phase 1 in the Blair Waterway. This volume will be determined based on pre- and post- dredging site measurements using procedures established by State. If such procedures are not established by State, then volume will be based on the barge volume times the number of trips to the site.

2.02 Positioning. Grantee, its contractor, or operator shall fix and record exact position (latitude and longitude to the nearest one-thousandths of a minute) at the initiation and completion of discharge and shall concentrate the dumping of material at the center of the site, unless otherwise specified. The vessel's position shall be fixed by using a global positioning system (GPS), the Coast Guard Puget Sound Vessel Traffic Service (PSVTS), Radar, LORAN-C, SATNAV, or any other methods approved by State. Grantee, its contractor, or operator shall also record the reading on the vessel's fathometer at the time of discharge of the material. In areas where the Coast Guard PSVTS is available, Grantee, its contractor, or operator shall notify PSVTS ("Seattle Traffic" on VHF-FM Channel 14) prior to arriving at the disposal site and shall obtain US Coast Guard notification that the barge is on site at the time of dumping. If such notification is not received the material shall not be dumped. Position and fathometer recordings shall be made on Disposal Site Use Report forms (see Subsection 4.02) provided by State.

2.03 Cleanup. All floatable debris coming from material disposed of at the site shall be collected and disposed of on land by Grantee. Grantee shall comply with all federal, state, and local laws, regulations, rules or ordinances in disposing of any such debris.

2.04 Other. From time-to-time, if it is determined that additional environmental conditions or benefits to the public are necessary, State reserves the right to amend this use authorization to include such conditions.

2.05 Disposal Method. All disposals of approved dredged materials shall be done in accordance with the specifications set forth in the Plan of Operations (Attachment A). In addition to any requirements described in the Plan of Operations, Grantee must only use bottom dump barges to dispose of the approved dredged material at this site. Use of any type of barge other than a bottom dump barge is prohibited, unless expressly approved in a separate writing by the State before the commencement of any disposal activity.

SECTION 3 PAYMENT

The payment of these fees to State is the essence of this use authorization, and the same shall be, and is, a condition precedent to the execution and continuance of this use authorization or any rights thereunder.

3.01 Minimum Fee. Grantee shall pay State a fee of \$2,000.00 or \$0.45 for each cubic yard dumped, whichever is larger as provided in WAC 332-30-166(9) or as hereafter amended, with the initial \$2,000.00 per permit being a minimum nonrefundable fee.

3.02 Payment. The payment of the minimal nonrefundable fee to State is a condition precedent to the execution of this permit. Failure to pay any required fees in addition to the nonrefundable fee shall be grounds for termination or suspension of the permit. Payment is to be made to the Department of Natural Resources, Financial Management Division, PO Box 47041, Olympia, Washington 98504-7041, in the following manner:

\$2,000.00 is due and payable at time of application. Additional payments, as provided by Subsection 3.01; if any, due monthly not more than thirty (30) days after completion of each calendar month's dredging. Payments to be based on either actual amounts dumped or estimates based on barge volume.

3.03 Records. Grantee shall keep an accurate record and account of all materials deposited at the above described site, including but not limited to those records required by Section 2.02 of this use authorization on the Disposal Site Use Report (see Subsection 4.02). State shall be allowed to inspect and audit books, contracts and accounts of Grantee to determine whether State is being paid the full amount payable to it for the disposal of such material, and to ensure that the material discharged at the open water disposal site originated at an approved dredging site.

3.04 Application Fee Adjustments. The fees stated herein may be reviewed and adjusted annually or more often as needed in accordance with WAC 332-30-166(9) as enacted and as hereafter amended.

SECTION 4 REQUIREMENTS

4.01 Notification. Grantee shall observe the completed Plan of Operation (Attachment A) submitted in writing to State at least five working days in advance of first use. State must be notified of, and approve any changes in the Plan of Operations at least twenty-four (24) hours before the changes are implemented. Notification by Grantee, and subsequent approval by State, may be made verbally. However, the verbal notification must be followed by submission of a revised Plan of Operation within five (5) working days. State shall be notified by telephone at (360) 902-1735, twenty-four (24) hours prior to each startup of dredging operations. Grantee also shall notify State by letter immediately upon completing use of the site.

4.02 Disposal Site Use Report. The tug captain shall fill out a Disposal Site Use Report (provided by State) at the time of each disposal event. It is the responsibility of Grantee to ensure that the completed forms are forwarded to State at the completion of each week's disposal operations.

4.03 Volume Reporting. Within twenty (20) days of completing dredging operations for a calendar month, Grantee shall forward a summary of that month's disposal information to State. The summary shall include the volumes of material deposited at the site or volumes estimated from barge volume, and shall be provided on a Monthly Disposal Statement form provided by State.

4.04 Compliance. Grantee shall conform to any applicable law, regulation, permit, or license of any public authority affecting the disposal site premises and the use thereof, and shall correct at Grantee's own expense any failure of compliance created through Grantee's fault or by reason of Grantee's use. If any other permit or license condition changes during the term of this use authorization, those changed conditions shall apply to Grantee.

4.05 Permits. Procurement of the necessary permits and licenses, excepting the shoreline permit for the disposal site, shall be solely the responsibility of Grantee.

4.06 Indemnity. Grantee shall indemnify and save harmless State, its employees, officers and agents from any and all liability, damages (including environmental damages, damages to land, aquatic life, and other natural resources), expenses, causes of action, suits, claims, costs, fees (including attorneys' fees and costs), penalties (civil or criminal), and response, clean-up, and habitat restoration costs assessed, imposed or incurred as a result of the use, occupation or control of the site by Grantee's employees, agents, assigns, contractors, subcontractors, licensees, or invitees. This indemnity shall not extend to liability arising solely out of the willful or grossly negligent act of State or State's agents.

4.07 Damages. In addition to other remedies available to it under the law, State may charge Grantee a fee of \$5.00 per cubic yard for all dumping not in conformance with the use authorization, WAC 332-30-166 or other statute, rule, regulation or ordinance governing the activity, including, but not limited to, materials not approved for open water disposal, failure to give proper notification, dumping without valid permits and/or dumping outside the disposal zone.

4.08 Shoreline Permit. This Open Water Disposal Site Use Authorization is subject to the conditions contained in the shoreline permit issued for the aforementioned site and any conditions and/or provisions contained therein.

4.09 Breach. In addition to any other remedies available, if any condition of this use authorization is violated by Grantee, State may suspend or terminate this use authorization. Any action by a contractor, operator, or agent of Grantee may be imputed to Grantee.

4.10 Survival. All obligations of Grantee to be performed prior to the expiration or earlier termination shall not cease upon termination or expiration of this use authorization, and shall continue as obligations until fully performed. All clauses of this use authorization (including but not limited to 4.06 (Indemnity)), which require performance beyond the termination or expiration date shall survive the termination or expiration date of this use authorization.

Grantee expressly agrees to all covenants herein and binds itself for the payment hereinbefore specified.

Signed this 23 day of July, 2015

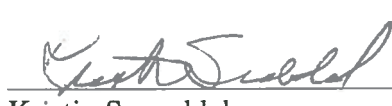
GRANTEE:
Port of Tacoma



Scott Hooton
Port of Tacoma, Environmental Project Manager
PO Box 1837
Tacoma WA 98401

Executed this 24 day of July, 2015.

STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES



Kristin Swenddal
Aquatic Resources Division Manager
PO BOX 47027
Olympia WA 98504-7027

STATE OF WASHINGTON)
)ss.
COUNTY OF Pierce)

DATED: 7/23/2015

(Notary Signature)

Notary Public in and for the State of Washington
residing at Pierce County
My Commission Expires: 3/6/2019

CERTIFICATE OF ACKNOWLEDGMENT
STATE OF WASHINGTON

STATE OF WASHINGTON)
COUNTY OF Thurston)ss.

I certify that I know or have satisfactory evidence that KRISTIN SWENDDAL is the person who appeared before me, and is the Aquatic Resources Division Manager of the STATE OF WASHINGTON DEPARTMENT OF NATURAL RESOURCES. I further certify that said person acknowledged the foregoing to be the free and voluntary act of the STATE OF WASHINGTON DEPARTMENT OF NATURAL RESOURCES for the uses and purposes mentioned in the instrument, and on oath stated that she is duly authorized to execute and acknowledge said instrument.

DATED: 7-24-2015

SEAL



Andrea Wagner
(Notary Signature)
Notary Public in and for the State of Washington
residing at Olympia
My Commission Expires: 9-16-18

Port of Tacoma

Pier 4 Phase 1 Removal Action Project

Clean Material Dredge Report

Weather: AM- Sun and Clouds PM- Sun
Temperature: Low: ° 60 High: ° 80 **Precipitation** 0

Day: Mon - Fri
Date: 8/24/15 - 8/28/15

Project Staff				TOTAL	Description of Work Performed by OMGI	Qty Placed
Proj. Mngr:					Dredged from Station 0+00 to approximately 8+00 from Monday - Friday. All material taken to open water disposal site.	This Week: Dredged: 9428 TN, 6247 CY Open Water Disposal: 9428 TN / 6247 CY To Date: Dredged: 9428 TN / 6247 CY Open Water Disposal: 9428 TN / 6247 CY
Proj. Supt Casey Shaw				1		
Eric Sawin				1		
TYPE	4MAN	JRNY	APP			
Operators		2		2		
Pilebucks	1			1		
Carpenters				0		
Laborers				0		
Cement Mason				0		
Electricians				0		
TOTAL				5		
EQUIPMENT (major equipment only)					Verbal Instructions Received / Delays / Possible Changes / Remarks	
Equip No.	Description				Dredged Monday - Friday. Friday: Delayed from 0600 to 1100 due to additional concrete and timber stub piles. Water Quality Monitoring: Tier 2 Routine Monitoring on Tuesday and Thursday. Only 1 monitoring event on Thursday due to work stops and short shift.	
BK-K-0001	DB Rainier - 165 TN Barge					
BT-K-0012	Tug Skagit					
	Tug Fury					
HB-A-0004	Hopper Barge - Orion 2001					
Material Received (Received by/Stored)					On-Site Inspections & Meetings	
					Company	Description (Topic, Insp. location, test)
SAFETY: (Infractions, near misses, accidents. Describe corrective action taken.)						
Safety meeting held today? Subject:						
SUBCONTRACTORS						
Company	Labor #	Shift Hrs	Description of Work Performed			
Tug Fury	3	10	Moved DB Rainier during dredging and tow dump scow to disposal site			
			VISITORS / NOTES			
Casey Shaw 8/24/15 - 8/28/15						
Superintendent Date						

Day: Mon - Fri
Date: 8/31/15 - 9/4/15

[illegible]

Weather: AM- Sun and Clouds PM- Sun
Temperature: Low: ° 60 High: ° 75 **Precipitation** 0

Day: Mon - Fri
Date: 9/7/15 - 9/14/15

Project Staff				TOTAL	Description of Work Performed by OMGI	Qty Placed
Proj. Mngr:					Dredged from Station 8+00 to approximately 10+00 from Monday - Tuesday. All material taken to open water disposal site.	This Week: Dredged: 1450 TN, 868 CY Open Water Disposal: 1450 TN / 868 CY To Date: Dredged: 14482 TN / 9408 CY Open Water Disposal: 14482 TN / 9408 CY
Proj. Supt Casey Shaw						
Eric Sawin						
TYPE	4MAN	JRNY	APP			
Operators		2		2		
Pilebucks	1			1		
Carpenters				0		
Laborers				0		
Cement Mason				0		
Electricians				0		
TOTAL				5		
EQUIPMENT (major equipment only)					Verbal Instructions Received / Delays / Possible Changes / Remarks	
Equip No.	Description				Dredged Friday (9/11) and Monday (9/14) Water Quality Monitoring: Tier 2 Routine Monitoring	
BK-K-0001	DB Rainier - 165 TN Barge					
BT-K-0012	Tug Skagit					
	Tug Fury					
HB-A-0004	Hopper Barge - Orion 2001					
Material Received (Received by/Stored)					On-Site Inspections & Meetings	
					Company	Description (Topic, Insp. location, test)
SAFETY: (Infractions, near misses, accidents. Describe corrective action taken.)						
Safety meeting held today? Subject:						
SUBCONTRACTORS						
Company	Labor #	Shift Hrs	Description of Work Performed			
			VISITORS / NOTES			
Casey Shaw			9/7/15 - 9/14/15			
Superintendent			Date			

Pier 4 Removal Action Project

Clean Dredge Report Package

Response to KPFF and Port Comments:

- From Page 3: “Please explain what the material factor is. Is it used to compute quantity? If so, then how?”
 - The material factor is the ratio of Tons per Cubic Yard. It is determined by weighing one cubic foot of material and converting that to the weight of one cubic yard.
 - Our displacement tables for our barges are in tons and we use the material factor to determine the cubic yards of material on the barge.
- From Page 3: “This number does not correspond to the material weight indicated below. Verify math”.
 - $2120 \text{ TN} / 1.40 \text{ TN per CY} = 1514 \text{ CY}$
- From Page 3: “What does this correspond to?”
 - It is the horizontal distance from the top of the slope in which was our work zone.
- From Page 3: “What does the stationing correspond to? Has a stationing plan been submitted?”
 - We developed the stationing for the project for our use. Generally, the project north demolition limit is 0+00 and the stationing increases as you work south. The south project demolition limit is 10+72.
- From Page 5: “Is this referring to the “finger” left at the north end of the substation?”
 - Yes
- From Page 6: “Was this comment inadvertently copied from previous day?”
 - No, we encountered it on multiple days as we worked in the area of the substation.
- From Page 8: “Should this be 9+25?”
 - Yes
- From Page 11: “Was this done in one day or two?”
 - We attempted to do it on 9/11 but our bucket was not able to dig in the type of material that was present. We waited until 9/14 so we could use our digging bucket.

ORION MARINE GROUP

DAILY DREDGING REPORT

JOB NO. 09P00106
 JOB NAME Pier 4 Phase 1 Removal Action

DATE 8/24/2015
 SHIFT 1

SUPERINTENDENT Casey Shaw

WEATHER: Sunny

TEMP.: 77

OMG Work Force		
Crane Operator	1	Chad Johnson
Deck Engineer	1	Tony Klundt
Pilebuck FM	1	John Anderson
Tug Operator	1	Craig Larson
Pilebuck	1	Jason Morgan
Pilebuck	1	Zack Garten

Equipment				
Equipment Type	Status			Activity Description
	Up	Dwn	Std-By	
DB Rainier	X			Dredge
Tug Skagit	X			Dredge
Orion 2001 - Material Barge	X			Dredge

Daily Barge Loading					
Barge	Freeboard - Empty	Matl. Factor	Freeboard - Full	TN	CY
2001 - Dredge/Loading	11.79	1.40	3.48	2120.00	1514.29

Start Station	End Station	Width of Cut	Depth	Notes				
3+00	1+50	30.0	Grade	2:1 Slope to -2				
Total Quantities	Today Qty				To Date Qty			
UPLAND TRANSLOAD	0	TN	0	CY	0	TN	0	CY
IN WATER DREDGING	2120.00	TN	1514.29	CY	2,120	TN	1,514	CY

Description of Work Performed	
0730	3+00
1530	Done Dredging at 1+50, head to dump station
1730	Back at Pier 4 Site

NOTES: (Verbal Instructions, Changed Conditions)
Material Weight: 106 #/CF.

DOWNTIME/DELAYS/STANDBY

Inspections, Surveys & Monitoring Activities:
Water quality monitoring - No exceedances

Safety: (Infractions, near misses, accidents, etc)

ORION MARINE GROUP

DAILY DREDGING REPORT

JOB NO. 09P00106
 JOB NAME Pier 4 Phase 1 Removal Action

DATE 8/25/2015
 SHIFT 2

SUPERINTENDENT Casey Shaw

WEATHER: Sunny

TEMP.: 77

OMG Work Force		
Crane Operator	1	Chad Johnson
Deck Engineer	1	Tony Klundt
Pilebuck FM	1	John Anderson
Tug Operator	1	Craig Larson
Pilebuck	1	Jason Morgan
Pilebuck	1	Zack Garten

Equipment				
Equipment Type	Status			Activity Description
	Up	Dwn	Std-By	
DB Rainier	X			Dredge
Tug Skagit	X			Dredge
Orion 2001 - Material Barge	X			Dredge

Daily Barge Loading					
Barge	Freeboard - Empty	Matl. Factor	Freeboard - Full	TN	CY
2001 - Dredge/Loading	11.85	1.40	5.75	1569.00	1120.71

Start Station	End Station	Width of Cut	Depth	Notes				
1+50	0+50	30.0	Grade	2:1 Slope to -2				
Total Quantities	Today Qty				To Date Qty			
UPLAND TRANSLOAD	0	TN	0	CY	0	TN	0	CY
IN WATER DREDGING	1569.00	TN	1120.71	CY	3,689	TN	2,635	CY

Description of Work Performed	
0530	Start Dredging at 1+50 working north
1530	Done Dredging at 0+50, head to dump station
1730	Back at Pier 4 Site

NOTES: (Verbal Instructions, Changed Conditions)
Material Weight: 106 #/CF.

DOWNTIME/DELAYS/STANDBY
1100 - Stn 1+00 started digging on creosote wingwall that was not shown in the plans. From there to Stn. 0+50, 50% of the buckets (majority was at higher elevations) have contained creosote and are being bucketed to the beach and loaded onto lined stockpile. Will need to be disposed of at LRI. Tracking the time involved with creosote material.

Inspections, Surveys & Monitoring Activities:
Water quality monitoring - No exceedances

Safety: (Infractions, near misses, accidents, etc)

ORION MARINE GROUP

DAILY DREDGING REPORT

JOB NO. 09P00106
 JOB NAME Pier 4 Phase 1 Removal Action

DATE 8/26/2015
 SHIFT 3

SUPERINTENDENT Casey Shaw

WEATHER: Sunny

TEMP.: 77

OMG Work Force		
Crane Operator	1	Chad Johnson
Deck Engineer	1	Tony Klundt
Pilebuck FM	1	John Anderson
Tug Operator	1	Doug
Pilebuck	1	Jason Morgan
Pilebuck	1	Zack Garten
Fury Deckhand	1	
Fury Deckhand	1	

Equipment				
Equipment Type	Status			Activity Description
	Up	Dwn	Std-By	
DB Rainier	X			Dredge
Tug Skagit		X		Drydock
Orion 2001 - Material Barge	X			Dredge
Tug Fury	X			Dredge

Daily Barge Loading					
Barge	Freeboard - Empty	Matl. Factor	Freeboard - Full	TN	CY
2001 - Dredge/Loading	11.79	1.80	3.31	2170.00	1205.56

Start Station	End Station	Width of Cut	Depth	Notes			
0+50	0+00	30.0	Grade	2:1 Slope to -2			
3+00	3+50	30.0	Grade	2:1 Slope to -2			
Total Quantities	Today Qty				To Date Qty		
UPLAND TRANSLOAD	0	TN	0	CY	0	TN	0
IN WATER DREDGING	2170.00	TN	1205.56	CY	5,859	TN	3,841

Description of Work Performed	
0530	Start Dredging at 0+50 working north
1000	Done Dredging at 0+00, move 3+00 and work south
1530	Done Dredging at 4+50, head to dump station
1730	Back at Pier 4 Site

NOTES: (Verbal Instructions, Changed Conditions)
Material Weight: 136 #/CF.

DOWNTIME/DELAYS/STANDBY
Stn. 1+00 - Stn. 0+00 involved digging on creosote wingwall that was not shown in the plans. At Port's direction, we left wingwall in place today and attempted to dig around. Stn. 3+00-3+20 we were directed to slope down from the 50' radius of the sub station to -2. After that, we dug from the face of the batters at the substation to -2, material sloughing in continually. Directed to let it be to not undermine slope. Finished at 4+50.

Inspections, Surveys & Monitoring Activities:
Water quality monitoring - No exceedances

Safety: (Infractions, near misses, accidents, etc)

ORION MARINE GROUP

DAILY DREDGING REPORT

JOB NO. 09P00106
 JOB NAME Pier 4 Phase 1 Removal Action

DATE 8/28/2015
 SHIFT 5

SUPERINTENDENT Eric Sawin

WEATHER: Overcast

TEMP.: 73

OMG Work Force		
Crane Operator	1	Chad Johnson
Deck Engineer	1	Tony Klundt
Pilebuck FM	1	John Anderson
Tug Operator	1	Doug
Pilebuck	1	Jason Morgan
Pilebuck	1	Zack Garten
Fury Deckhand	1	
Fury Deckhand	1	

Equipment				
Equipment Type	Status			Activity Description
	Up	Dwn	Std-By	
DB Rainier	X			Dredge
Tug Skagit		X		Drydock
Orion 2001 - Material Barge	X			Dredge
Tug Fury	X			Dredge

Daily Barge Loading					
Barge	Freeboard - Empty	Matl. Factor	Freeboard - Full	TN	CY
2001 - Dredge/Loading	11.79	1.46	5.96	1488.00	1019.18

Start Station	End Station	Width of Cut	Depth	Notes			
7+00	8+00	30.0	Grade	2:1 Slope to -2			
Total Quantities	Today Qty				To Date Qty		
UPLAND TRANSLOAD	0	TN	0	CY	0	TN	0
IN WATER DREDGING	1488.00	TN	1019.18	CY	9,428	TN	6,247

Description of Work Performed	
0600	Went to start dredging, stub pile in the way of moving DB Rainier into position
1100	DB St. Helens done pulling additional stub pile, DB Rainier was on stand by from 0600 to 1100
1100	Start dredging from Sta. 7+00 working south
1545	Stop dredging at Sta. 8+00
1600	Tug Fury left Pier 4 to take 2001 Barge to open water disposal site and dispose of material per permit regulations
1830	Tug Fury returned 2001 Barge to Pier 4 site. Pier 4 site secured for the weekend.

NOTES: (Verbal Instructions, Changed Conditions)

Material Weight: 108 #/CF.

DOWNTIME/DELAYS/STANDBY

Stn. 7+00, Crew with DB St. Helens went to remove 1 stub pile that was previously discovered and diver found 3 EA concrete and 2 EA timber stub pilings that were below the waterline but prevented our dump scow and DB Rainier from being able to move into position to continue dredging to the south. DB St. Helens crew removed these additional pile from 0600 to 1100, DB Rainier on standby while these additional pilings are removed. At 1100, DB Rainier and crew begin dredging from Stn. 7+00 to 8+00. Eric Sawin had phone conversation with Stanley Ryter to inform him of the additional pilings, the phone conversation was followed up with an email.

Inspections, Surveys & Monitoring Activities:

Water quality monitoring - No exceedances

Safety: (Infractions, near misses, accidents, etc)

ORION MARINE GROUP

DAILY DREDGING REPORT

JOB NO. 09P00106
 JOB NAME Pier 4 Phase I Removal Action

DATE 8/31/2015
 SHIFT 6

SUPERINTENDENT Eric Sawin

WEATHER: Overcast

TEMP.: 64

OMG Work Force		
Crane Operator	1	Chad Johnson
Deck Engineer	1	Tony Klundt
Pilebuck FM	1	John Anderson
Tug Operator	1	Doug
Pilebuck	1	Jason Morgan
Pilebuck	1	Zack Garten
Fury Deckhand	1	
Fury Deckhand	1	

Equipment				
Equipment Type	Status			Activity Description
	Up	Dwn	Std-By	
DB Rainier	X			Dredge
Tug Skagit		X		Drydock
Orion 2001 - Material Barge	X			Dredge
Tug Fury	X			Dredge

Daily Barge Loading					
Barge	Freeboard - Empty	Matl. Factor	Freeboard - Full	TN	CY
2001 - Dredge/Loading	11.77	1.62	3.59	2099.00	1295.68

Start Station	End Station	Width of Cut		Depth	Notes			
8+00	9+25	30.0		Grade	2:1 Slope to -2			
Total Quantities	Today Qty				To Date Qty			
UPLAND TRANSLOAD	0	TN	0	CY	0	TN	0	CY
IN WATER DREDGING	2099.00	TN	1295.68	CY	11,527	TN	7,543	CY

Description of Work Performed	
0600	Start dredging from Sta. 8+00 working south
1345	Stop dredging at Sta. 9+25
1400	Tug Fury left Pier 4 to take 2001 Barge to open water disposal site and dispose of material per permit regulation
1600	Tug Fury returned 2001 Barge to Pier 4 site.

NOTES: (Verbal Instructions, Changed Conditions)
Material Weight: 120 #/CF.

DOWNTIME/DELAYS/STANDBY

Inspections, Surveys & Monitoring Activities:
Water quality monitoring - No exceedances

Safety: (Infractions, near misses, accidents, etc)

ORION MARINE GROUP

DAILY DREDGING REPORT

JOB NO. 09P00106
 JOB NAME Pier 4 Phase 1 Removal Action

DATE 9/1/2015
 SHIFT 7

SUPERINTENDENT Eric Sawin

WEATHER: Overcast

TEMP.: 65

OMG Work Force		
Crane Operator	1	Chad Johnson
Deck Engineer	1	Tony Klundt
Pilebuck FM	1	John Anderson
Tug Operator	1	Doug
Pilebuck	1	Jason Morgan
Pilebuck	1	Zack Garten
Fury Deckhand	1	
Fury Deckhand	1	

Equipment				
Equipment Type	Status			Activity Description
	Up	Dwn	Std-By	
DB Rainier	X			Dredge
Tug Skagit		X		Drydock
Orion 2001 - Material Barge	X			Dredge
Tug Fury	X			Dredge

Daily Barge Loading					
Barge	Freeboard - Empty	Matl. Factor	Freeboard - Full	TN	CY
2001 - Dredge/Loading	11.71	1.51	5.79	1505.00	996.69

Start Station	End Station	Width of Cut	Depth	Notes
9+25	10+00	30.0	Grade	2:1 Slope to -2

Total Quantities	Today Qty				To Date Qty			
UPLAND TRANSLOAD	0	TN	0	CY	0	TN	0	CY
IN WATER DREDGING	1505.00	TN	996.69	CY	13,032	TN	8,539	CY

Description of Work Performed	
0600	Start dredging from Sta. 9+25 South
0900	Stop dredging at Sta. 10+00 and moved back up North for the clean up pass
1615	Completed clean up pass from 0+00 to 10+00
1615	Tug Fury left Pier 4 to take 2001 Barge to open water disposal site and dispose of material per permit regulation
1730	Tug Fury returned 2001 Barge to Pier 4 site.
1800	E-trac on site to complete hydro survey

NOTES: (Verbal Instructions, Changed Conditions)
Material Weight: 112 #/CF.

DOWNTIME/DELAYS/STANDBY

Inspections, Surveys & Monitoring Activities:
Water quality monitoring - No exceedances

Safety: (Infractions, near misses, accidents, etc)

ORION MARINE GROUP

DAILY DREDGING REPORT

JOB NO. 09P00106
 JOB NAME Pier 4 Phase 1 Removal Action

DATE 9/11/2015
 SHIFT 8

SUPERINTENDENT Eric Sawin

WEATHER: Clear, Sun

TEMP.: 75

OMG Work Force		
Crane Operator	1	Chad Johnson
Deck Engineer	1	Tony Klundt
Pilebuck FM	1	John Anderson
Tug Operator	1	Craig Larson
Pilebuck	1	Zack Garten
Pilebuck	1	Andy Savoie

Equipment				
Equipment Type	Status			Activity Description
	Up	Dwn	Std-By	
DB Rainier	X			Dredge
Tug Skagit	X			Dredge
Orion 2001 - Material Barge	X			Dredge

Daily Barge Loading					
Barge	Freeboard - Empty	Matl. Factor	Freeboard - Full	TN	CY
2001 - Dredge/Loading	11.73	1.67	6.04	1450.00	868.26

Start Station	End Station	Width of Cut	Depth	Notes
0+00	10+00	30.0	Grade	2:1 Slope to -2

Total Quantities	Today Qty				To Date Qty			
UPLAND TRANSLOAD	0	TN	0	CY	0	TN	0	CY
IN WATER DREDGING	1450.00	TN	868.26	CY	14,482	TN	9,408	CY

Description of Work Performed	
0600	Start cleanup pass from 0+00 working south
1000	Repair Wire on DB Rainier
1200	Continue on cleanup pass
1500	Move material from watermain blowout back up the slope to fill in the hole
1600	Clean up and move DB Rainier offshore for survey
1630	E-trac on site to complete hydro survey

NOTES: (Verbal Instructions, Changed Conditions)
Material Weight: 124 #/CF.

DOWNTIME/DELAYS/STANDBY
Moved material from the watermain blowout back up the slope to fill in the hole that was created. This took approximately 1 hour for the entire crew and equipment.

Inspections, Surveys & Monitoring Activities:
Water quality monitoring - No exceedances

Safety: (Infractions, near misses, accidents, etc)

ORION MARINE GROUP

DAILY DREDGING REPORT

JOB NO. 09P00106
 JOB NAME Pier 4 Phase 1 Removal Action

DATE 9/14/2015
 SHIFT 9

SUPERINTENDENT Eric Sawin

WEATHER: Clear, Sun

TEMP.: 75

OMG Work Force		
Crane Operator	1	Chad Johnson
Deck Engineer	1	Tony Klundt
Pilebuck FM	1	John Anderson
Tug Operator	1	Craig Larson
Pilebuck	1	Zack Garten
Pilebuck	1	Andy Savoie

Equipment				
Equipment Type	Status			Activity Description
	Up	Dwn	Std-By	
DB Rainier	X			Dredge
Tug Skagit	X			Dredge
Orion 2001 - Material Barge	X			Dredge

Daily Barge Loading					
Barge	Freeboard - Empty	Matl. Factor	Freeboard - Full	TN	CY
2001 - Dredge/Loading	11.73	1.67	6.04	1450.00	868.26

Start Station	End Station	Width of Cut		Depth	Notes			
0+00	10+00	30.0		Grade	2:1 Slope to -2			
Total Quantities	Today Qty				To Date Qty			
UPLAND TRANSLOAD	0	TN	0	CY	0	TN	0	CY
IN WATER DREDGING	1450.00	TN	868.26	CY	14,482	TN	9,408	CY

Description of Work Performed	
0600	Work on material that we were directed to remove South of Substation. We had to remove rip rap and lagging piles. We also had to dig around the remaining batter piles, which caused loss of production
1030	Continue on cleanup pass
1230	Move material from watermain blowout back up the slope to fill in the hole
1430	Take 2001 barge out to open water disposal site for dumping
1700	Return from open water disposal

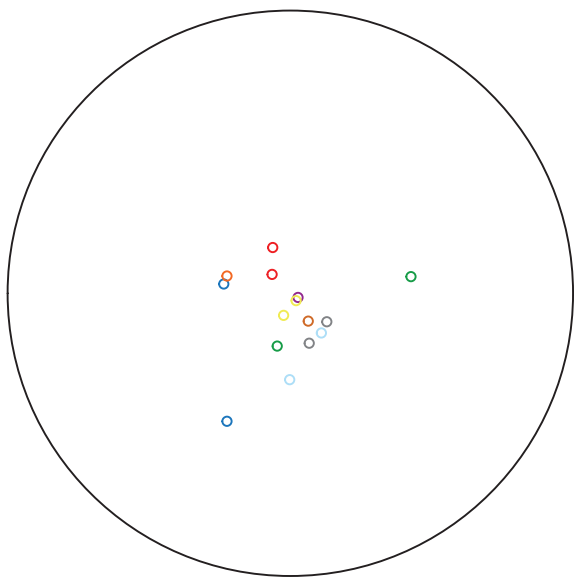
NOTES: (Verbal Instructions, Changed Conditions)
Material Weight: 124 #/CF.

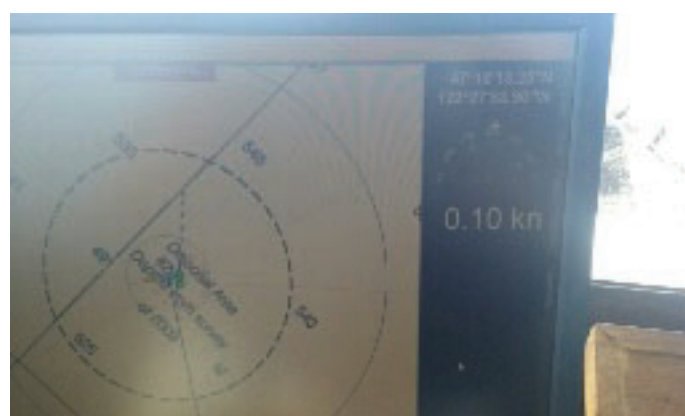
DOWNTIME/DELAYS/STANDBY
Moved material from the watermain blowout back up the slope to fill in the hole that was created. This took approximately 1 hour for the entire crew and equipment.

Inspections, Surveys & Monitoring Activities:
Water quality monitoring - No exceedances

Safety: (Infractions, near misses, accidents, etc)

Disposal Log									
Date	Dump Time	Operator	Approval Time	Initials	Start Coordinates	End Coordinates	Fathometer Reading	Distance from Center Start (ft)	Distance from Center End (ft)
8/24/2015	1621-1634	Craig Larson	1621	JRD	47 18 13.25 N, 122 27 53.07 W	47 18 13.25 N, 122 27 53.90 W	450	104	56
8/25/2015	1547-1555	Craig Larson	1547	JRD	47 18 14.26 N, 122 27 54.23 W	47 18 14.12 N, 122 27 58.46 W	609	143	303
8/26/2015	1617-1627	Doug Paterson	1617	RLH	47 18.2116 N, 122 27.9099 W	47 18.2116 N, 122 27.9099 W	495	19	19
8/27/2015	1444-1451	Doug Paterson	1627	RLH	47 18.2138 N, 122 27.9522 W	47 18.2031 N, 122 27.9278 W	435	183	107
8/28/2015	1632-1645	Doug Paterson	1632	JLP	47 18.2122 N, 122 27.9115 W	47 18.2165 N, 122 27.9192 W	435	8	50
8/31/2015	1433-1444	Doug Paterson	1433	MB	47 18.2078 N, 122 27.9219 W	47 18.2366 N, 122 27.8998 W	429	55	158
9/1/2015	1642-1652	Doug Paterson	1642	MC	47 18.1724 N, 122 27.8977 W	47 18.2184 N, 122 27.9350 W	380	243	112
9/14/2015	1623-1632	Craig Larson	1623	MAL	47 18 12.08 N, 122 27 55.32 W	47 18 12.44 N, 122 27 55.99 W	431	80	100











+ 47° 18.2116' N 144.2° M
122° 27.9099' W 0.03nm

0.50nm

21

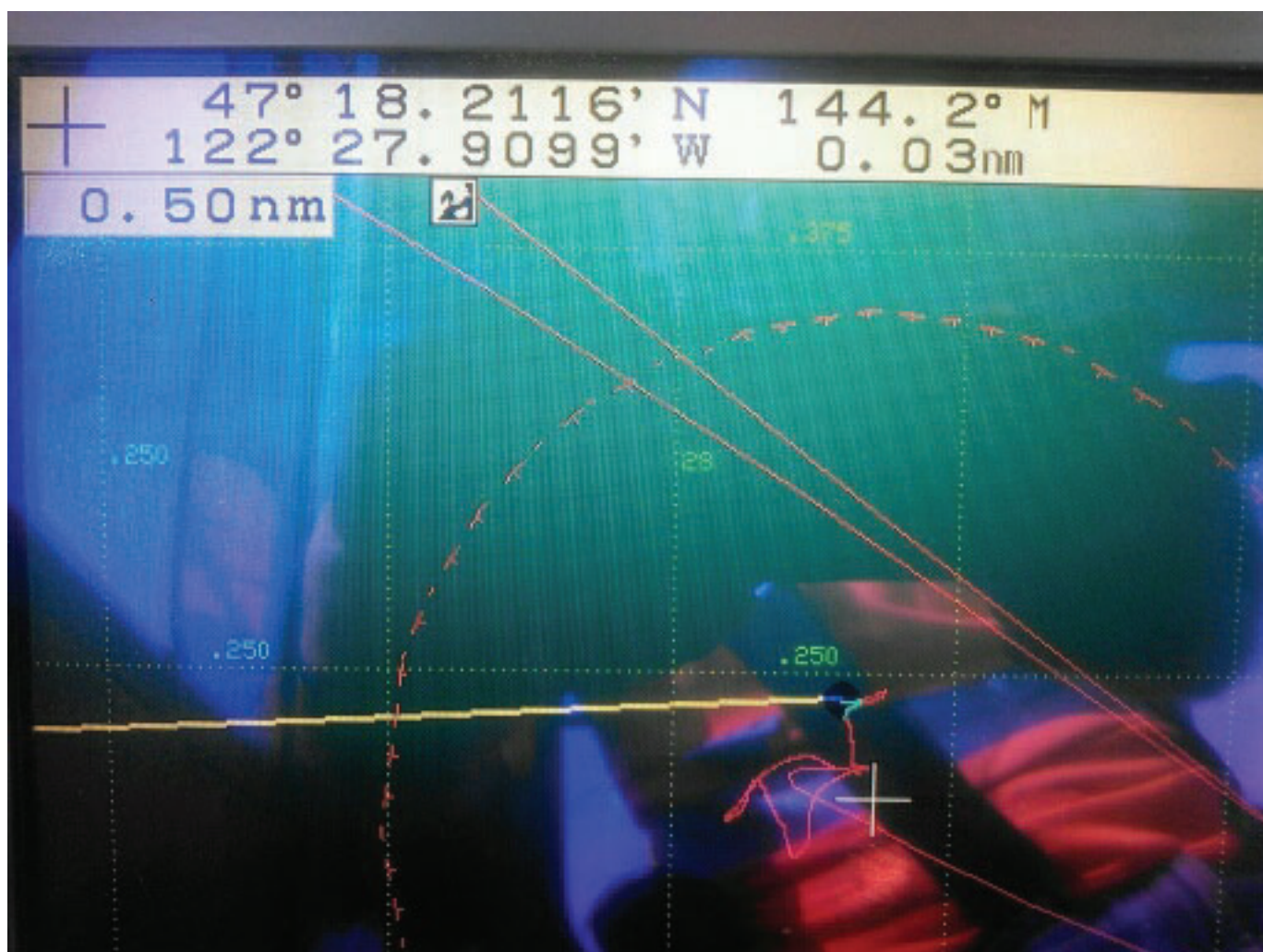
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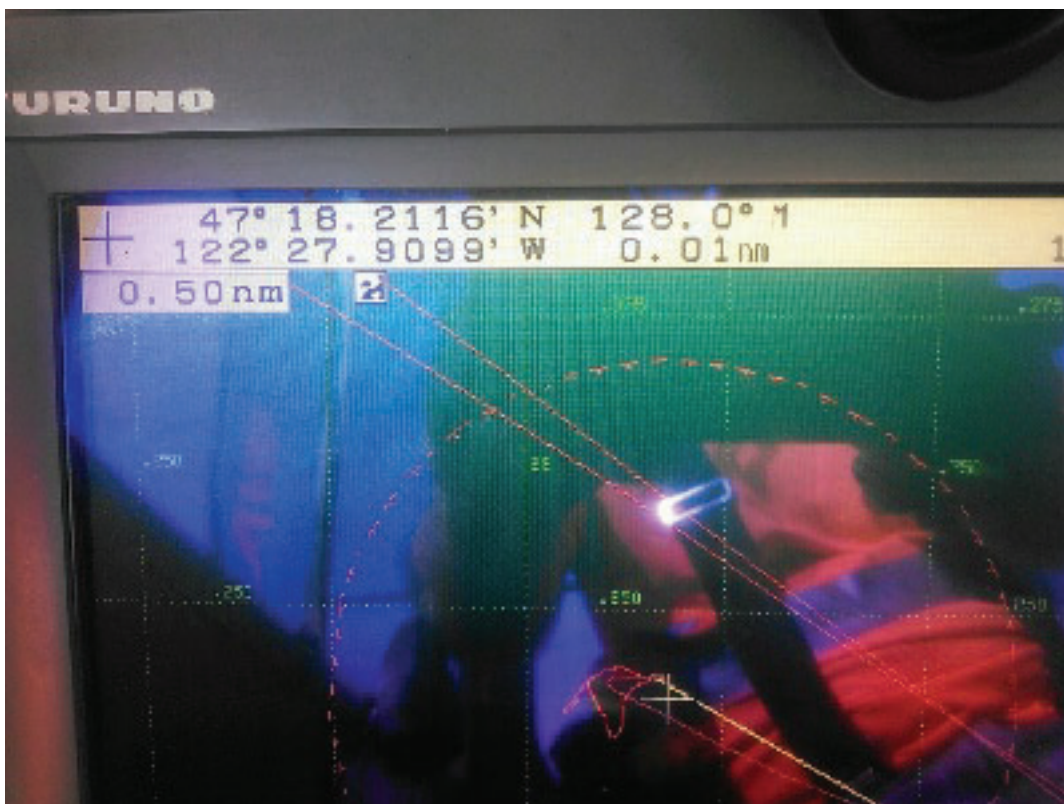
.250

.25

.250

.250





21:52:23

OK

OWN DYNAMIC DATA:

Date: 27/08/2015

Time: 21:52:23

Lat: 47°18.2031N

Long: 122°27.9278W

SOG: 000.4kts

COG: 130.9°

Screen

Continu

Voyager X3 Class A

21:43:53

OK

Exit

GPS

GPS

OWN DYNAMIC DATA:

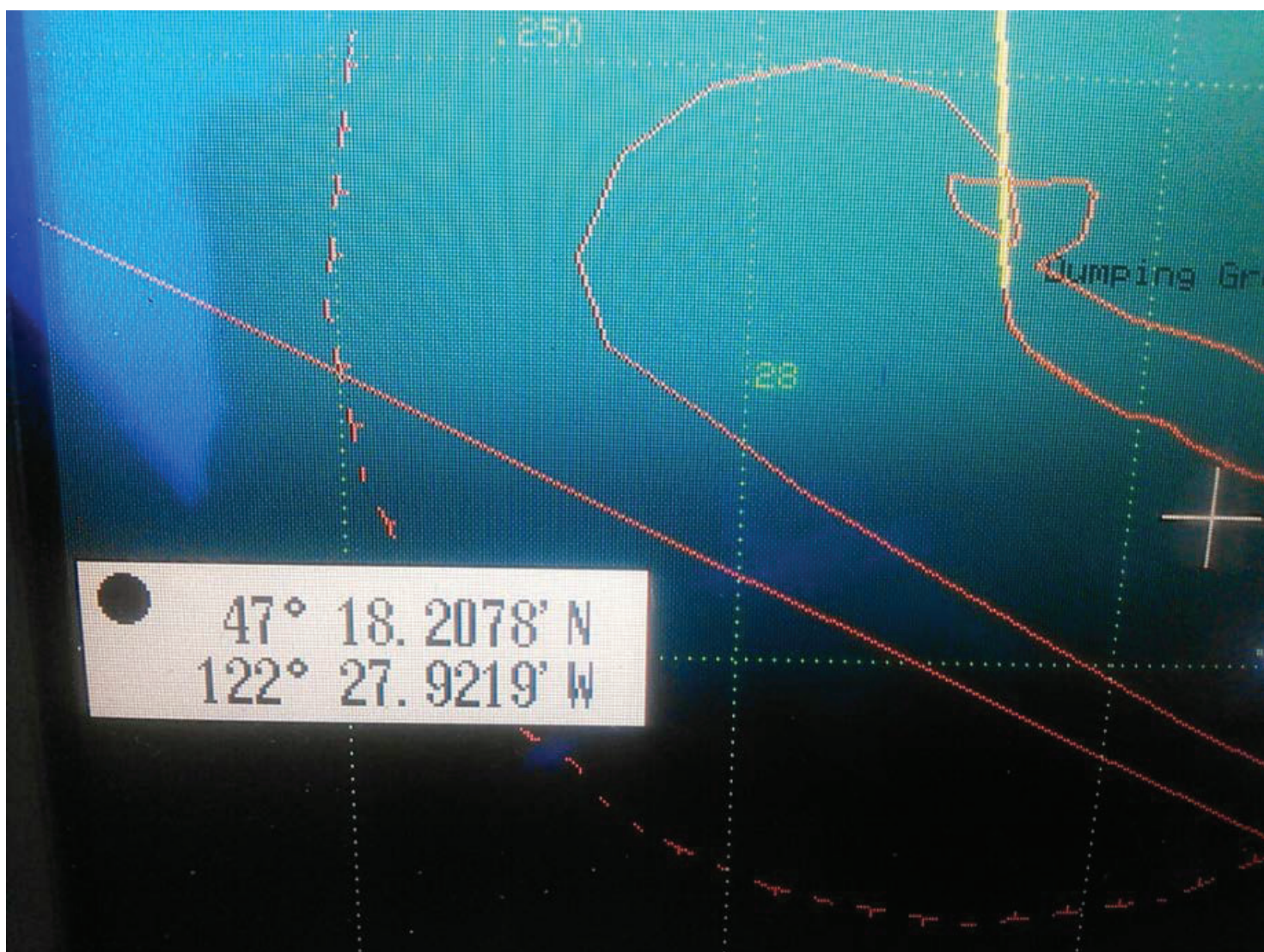
Date:	27/08/2015
Time:	21:43:53
Lat:	47°18.2138N
Long:	122°27.9522W
SOG:	001.0kts
COG:	293.9°

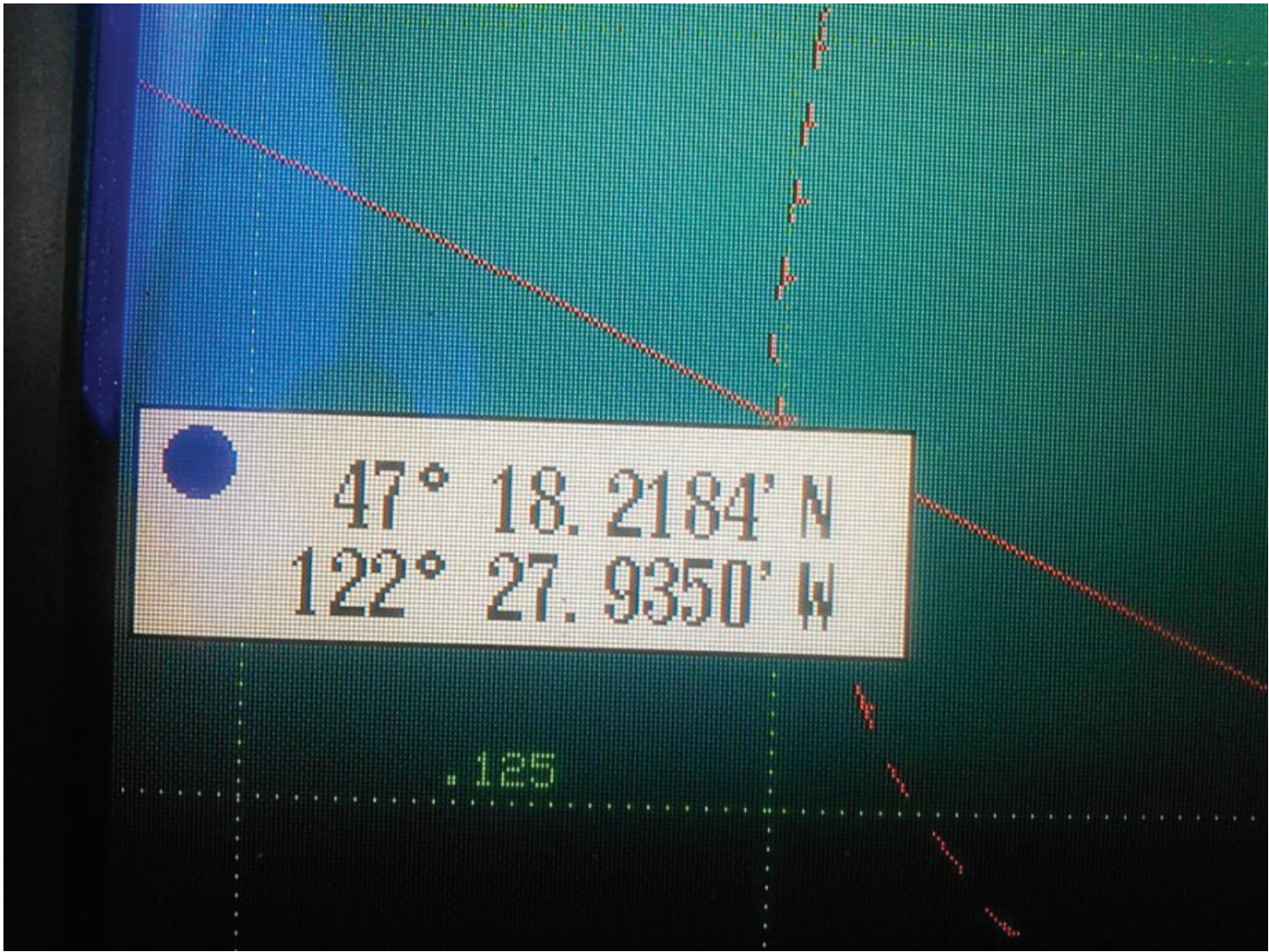
Screen












47° 18.2184' N
122° 27.9350' W

.125



47° 18.1724' N
122° 27.8977' W

16:23

Mon, September 14

47°18'12.08"N
122°27'55.32"W



0.10 kn

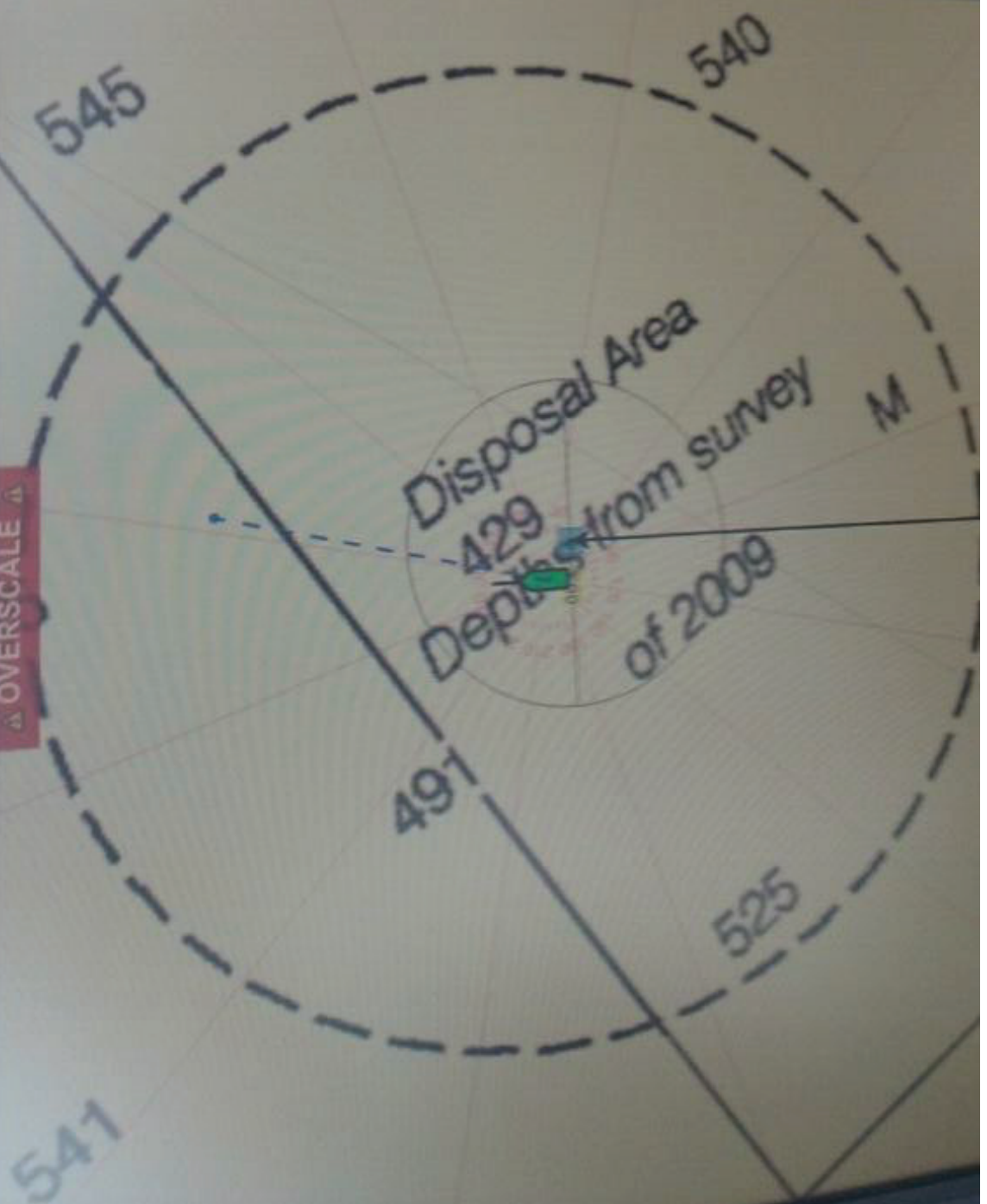
Properties Boat Places Vessels Instruments

ROUTE MONITOR
Activate a route to use the Route Monitor.

Activate Route

- ROUTE
- NEARBY
- EVENT
- MOB
- SCREEN
- RESET

OVERSCALE



Star 912N

Chart: 912N
Range: Mode

RESET

SCREEN

MOB

EVENT

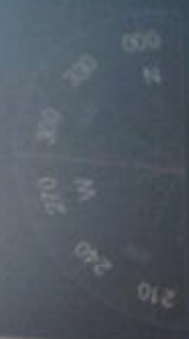
NEARBY

ROUTE

16:31
Mon, September 14
AGE 113

OVERSCALE

Properties
47°18'12.44"N
122°27'55.99"W



SOG

0.20 kn

DTG

Vessels

Places

Boat

Instruments

ROUTE MONITOR
Activate a route to view the
Route Monitor

Activate Route





DISPOSAL SITE USE REPORT

INSTRUCTIONS TO TUG CAPTAINS: This disposal site use report **MUST** be completed (in its entirety) at the time of each disposal for both VTS and non-VTS monitored sites. Position coordinates read from the approved positioning aid **MUST** be recorded to the NEAREST THOUSANDTHS of a minute (e.g., 47°, 56.556', 122°, 16.786').

Note: The site use report must be submitted by the Monday after disposal. If the site use report will not reach Washington DNR by the following Monday, a scanned copy will be accepted. If scanning is not an option, a phone call or email stating the use report(s) will be late, the date they were mailed, and estimated arrival date will be accepted. If you leave a voicemail, follow up with email to DMMP@dnr.wa.gov. Also, you can press "0" to the front desk for assistance.

DNR PERMIT NO.: 20-520039

CORPS OF ENGINEERS

PERMIT NUMBER and Project Manager or Permit signature-only required on first report of each day:

N/A - No USACE Permit for this Project

DREDGING SITE (Lat/Long): 47 16 22.29 / 122 24 25.65

DISPOSAL SITE: Commencement Bay non-dispersive

DATE/TIME OF DISPOSAL: August 24 / 2015

NAME OF TUG/TUG CAPTAIN: S. Ragot / Craig Larson

COMPANY/PHONE NUMBER: Orion Marine Contractors / 253-552-1140

NAME OF BARGE/TYPE: Orion 2001 / Hopper

VOLUME OF BARGE: 1,750

BARGE LOAD NO.: 1

FATHOMETER READING: 450 ft

FOR VTS SITES,

AUTHORIZATION OBTAINED

FROM COAST GUARD: (First and Last name), initials after VTS officer's name has been written in full once. Once shift change to a new officer, then full name, followed by initials until shift change occurs again:

JRD

AS BARGE STARTS TO OPEN (Also recorded for barge orientation schematic due no later with monthly report)

FOR DISPOSAL: (Required)

1621 117° 18' 13.25 N / 122° 27' 53.07 W

TIME

LATITUDE

LONGITUDE

AS BARGE COMPLETES (Same as above, will be recorded for completion of barge orientation schematic)

CLOSING AFTER DISPOSAL: (Required)

1634 117° 18' 13.25 N / 122° 27' 53.90 W

TIME

LATITUDE

LONGITUDE

ESTIMATED DISPOSAL

QUANTITY

1,514 yds

(how calculated required on monthly report)

DESCRIBE PERCENTAGE FLOATABLE MATERIAL REMOVED/DISPOSITION or other observations: None

NAME/TITLE (Tug Captain) OF PERSON FILLING

OUT REPORT/CONTACT NO.: Craig Larson 360-302-1246

SIGNATURE:

[Signature]



DISPOSAL SITE USE REPORT

INSTRUCTIONS TO TUG CAPTAINS: This disposal site use report **MUST** be completed (in its entirety) at the time of each disposal for both VTS and non-VTS monitored sites. Position coordinates read from the approved positioning aid **MUST** be recorded to the NEAREST THOUSANDTHS of a minute (e.g., 47°, 56.556', 122°, 16.786').

Note: The site use report must be submitted by the Monday after disposal. If the site use report will not reach Washington DNR by the following Monday, a scanned copy will be accepted. If scanning is not an option, a phone call or email stating the use report(s) will be late, the date they were mailed, and estimated arrival date will be accepted. If you leave a voicemail, follow up with email to DMMP@dnr.wa.gov. Also, you can press "0" to the front desk for assistance.

DNR PERMIT NO.: 20-520039

CORPS OF ENGINEERS

PERMIT NUMBER and Project Manager or Permit signature-only required on first report of each day:

N/A - No USACE Permit for this Project

DREDGING SITE (Lat/Long): 47 16 22.29 / 122 24 25.65

DISPOSAL SITE: Commencement Bay non-dispersive

DATE/TIME OF DISPOSAL:

August 25 / 2015

NAME OF TUG/TUG CAPTAIN:

SKagit / Craig Larson

COMPANY/PHONE NUMBER:

Orion Marine Contractors / 253-552-1140

NAME OF BARGE/TYPE:

Orion 2001 / Hopper

VOLUME OF BARGE:

1,750

BARGE LOAD NO.:

2

FATHOMETER READING:

609 ft

FOR VTS SITES,

AUTHORIZATION OBTAINED

FROM COAST GUARD: (First and Last name), initials after VTS officer's name has been written in full once.

Once shift change to a new officer, then full name, followed by initials until shift change occurs again:

JRD

AS BARGE STARTS TO OPEN (Also recorded for barge orientation schematic due no later with monthly report)
FOR DISPOSAL: (Required)

TIME

1347

LATITUDE

47° 18' 14.26" N

LONGITUDE

122° 27' 54.23" W

AS BARGE COMPLETES (Same as above, will be recorded for completion of barge orientation schematic)

CLOSING AFTER DISPOSAL: (Required)

TIME

1355

LATITUDE

47° 18' 14.2" N

LONGITUDE

122° 27' 58.46" W

ESTIMATED DISPOSAL

QUANTITY

1,120 yds

(how calculated required on monthly report)

DESCRIBE PERCENTAGE FLOATABLE MATERIAL

REMOVED/DISPOSITION or other observations:

None

NAME/TITLE (Tug Captain) OF PERSON FILLING

OUT REPORT/CONTACT NO.:

Craig R. Larson

SIGNATURE:

[Signature]



DISPOSAL SITE USE REPORT

INSTRUCTIONS TO TUG CAPTAINS: This disposal site use report **MUST** be completed (in its entirety) at the time of each disposal for both VTS and non-VTS monitored sites. Position coordinates read from the approved positioning aid **MUST** be recorded to the NEAREST THOUSANDTHS of a minute (e.g., 47°, 56.556', 122°, 16.786').

Note: The site use report must be submitted by the Monday after disposal. If the site use report will not reach Washington DNR by the following Monday, a scanned copy will be accepted. If scanning is not an option, a phone call or email stating the use report(s) will be late, the date they were mailed, and estimated arrival date will be accepted. If you leave a voicemail, follow up with email to DMMP@dnr.wa.gov. Also, you can press "0" to the front desk for assistance.

DNR PERMIT NO.: 20- 520039

CORPS OF ENGINEERS

PERMIT NUMBER and Project. Manager or Permit signature-only required on first report of each day:

N/A - No USACE Permit for this Project

DREDGING SITE (Lat/Long): 47 16 22.29 / 122 24 25.65

DISPOSAL SITE: Commencement Bay non-dispersive

DATE/TIME OF DISPOSAL: 08-26-15 1617-1427

NAME OF TUG/TUG CAPTAIN: FURY Doug Paterson

COMPANY/PHONE NUMBER: Orion Marine Contractors / 253-552-1140

NAME OF BARGE/TYPE: Orion 2001 / Hopper

VOLUME OF BARGE: 1,750

BARGE LOAD NO.: 3

FATHOMETER READING: 495 FATH

FOR VTS SITES,

AUTHORIZATION OBTAINED

FROM COAST GUARD: (First and Last name), initials after VTS officer's name has been written in full once. Once shift change to a new officer, then full name, followed by initials until shift change occurs again:

RLH

AS BARGE STARTS TO OPEN (Also recorded for barge orientation schematic due no later with monthly report)
FOR DISPOSAL: (Required)

TIME 1617 LATITUDE 47 18 21.6 LONGITUDE 122 27 90.99

AS BARGE COMPLETES (Same as above, will be recorded for completion of barge orientation schematic)

CLOSING AFTER DISPOSAL: (Required)
TIME 1627 LATITUDE 47 18 21.6 LONGITUDE 122 27 90.99

ESTIMATED DISPOSAL
QUANTITY

1206

(how calculated required on monthly report)

DESCRIBE PERCENTAGE FLOATABLE MATERIAL

REMOVED/DISPOSITION or other observations:

NAME/TITLE (Tug Captain) OF PERSON FILLING

OUT REPORT/CONTACT NO.

CAPT. Doug Paterson

SIGNATURE:

[Signature]



DISPOSAL SITE USE REPORT

INSTRUCTIONS TO TUG CAPTAINS: This disposal site use report **MUST** be completed (in its entirety) at the time of each disposal for both VTS and non-VTS monitored sites. Position coordinates read from the approved positioning aid **MUST** be recorded to the NEAREST THOUSANDTHS of a minute (e.g., 47°, 56.556', 122°, 16.786').

Note: The site use report must be submitted by the Monday after disposal. If the site use report will not reach Washington DNR by the following Monday, a scanned copy will be accepted. If scanning is not an option, a phone call or email stating the use report(s) will be late, the date they were mailed, and estimated arrival date will be accepted. If you leave a voicemail, follow up with email to DMMP@dnr.wa.gov. Also, you can press "0" to the front desk for assistance.

DNR PERMIT NO.: 20-520039

CORPS OF ENGINEERS

PERMIT NUMBER and Project Manager or Permit signature-only required on first report of each day:

N/A - No USACE Permit for this Project

DREDGING SITE (Lat/Long): 47 16 22.29 / 122 24 25.65

DISPOSAL SITE: Commencement Bay non-dispersive

DATE/TIME OF DISPOSAL: 8-27-13 1442-1452

NAME OF TUG/TUG CAPTAIN: FURY Doug Paterson

COMPANY/PHONE NUMBER: Orion Marine Contractors / 253-552-1140

NAME OF BARGE/TYPE: Orion 2001 / Hopper

VOLUME OF BARGE: 1,750

BARGE LOAD NO.: 4

EATHOMETER READING: 435

FOR VTS SITES,

AUTHORIZATION OBTAINED

FROM COAST GUARD: (First and Last name), initials after VTS officer's name has been written in full once. Once shift change to a new officer, then full name, followed by initials until shift change occurs again:

"RLB" RLH

AS BARGE STARTS TO OPEN (Also recorded for barge orientation schematic due no later with monthly report)

FOR DISPOSAL: (Required)

1444 47182031 122 27 9522

TIME

47182138

LONGITUDE

AS BARGE COMPLETES (Same as above, will be recorded for completion of barge orientation schematic)

CLOSING AFTER DISPOSAL: (Required)

1451 47182031 122 27 9278

TIME

LATITUDE

LONGITUDE

ESTIMATED DISPOSAL

QUANTITY

1387 YDS

(how calculated required on monthly report)

DESCRIBE PERCENTAGE FLOATABLE MATERIAL

REMOVED/DISPOSITION or other observations: NONE

NAME/TITLE (Tug Captain) OF PERSON FILLING

OUT REPORT/CONTACT NO.:

CAPT. Doug Paterson

SIGNATURE:

[Signature]



DISPOSAL SITE USE REPORT

INSTRUCTIONS TO TUG CAPTAINS: This disposal site use report **MUST** be completed (in its entirety) at the time of each disposal for both VTS and non-VTS monitored sites. Position coordinates read from the approved positioning aid **MUST** be recorded to the NEAREST THOUSANDTHS of a minute (e.g., 47°, 56.556', 122°, 16.786').

Note: The site use report must be submitted by the Monday after disposal. If the site use report will not reach Washington DNR by the following Monday, a scanned copy will be accepted. If scanning is not an option, a phone call or email stating the use report(s) will be late, the date they were mailed, and estimated arrival date will be accepted. If you leave a voicemail, follow up with email to DMMP@dnr.wa.gov. Also, you can press "0" to the front desk for assistance.

DNR PERMIT NO.: 20-520039

CORPS OF ENGINEERS

PERMIT NUMBER and Project. Manager or Permit signature-only required on first report of each day:

N/A - No USACE Permit for this Project

DREDGING SITE (Lat/Long): 47 16 22.29 / 122 24 25.65

DISPOSAL SITE: Commencement Bay non-dispersive

DATE/TIME OF DISPOSAL: 8/28/15 1632 -

NAME OF TUG/TUG CAPTAIN: _____

COMPANY/PHONE NUMBER: Orion Marine Contractors / 253-552-1140

NAME OF BARGE/TYPE: Orion 2001 / Hopper

VOLUME OF BARGE: 1,750

BARGE LOAD NO.: 5

FATHOMETER READING: 435

FOR VTS SITES,

AUTHORIZATION OBTAINED

FROM COAST GUARD: (First and Last name), initials after VTS officer's name has been written in full once.

Once shift change to a new officer, then full name, followed by initials until shift change occurs again: ILP

AS BARGE STARTS TO OPEN (Also recorded for barge orientation schematic due no later with monthly report)

FOR DISPOSAL: (Required)

TIME 1632 LATITUDE 47 18 2122 LONGITUDE 122 27 9115

AS BARGE COMPLETES (Same as above, will be recorded for completion of barge orientation schematic)

CLOSING AFTER DISPOSAL: (Required)

TIME 1645 LATITUDE 47 18 2165 LONGITUDE 122 27 9192

ESTIMATED DISPOSAL

QUANTITY 1019 YDS

(how calculated required on monthly report)

DESCRIBE PERCENTAGE FLOATABLE MATERIAL

REMOVED/DISPOSITION or other observations: _____

NAME/TITLE (Tug Captain) OF PERSON FILLING

OUT REPORT/CONTACT NO.: CAPT Doug Peterson

SIGNATURE: [Signature]



DISPOSAL SITE USE REPORT

INSTRUCTIONS TO TUG CAPTAINS: This disposal site use report **MUST** be completed (in its entirety) at the time of each disposal for both VTS and non-VTS monitored sites. Position coordinates read from the approved positioning aid **MUST** be recorded to the **NEAREST THOUSANDTHS** of a minute (e.g., 47°, 56.556', 122°, 16.786').

Note: The site use report must be submitted by the Monday after disposal. If the site use report will not reach Washington DNR by the following Monday, a scanned copy will be accepted. If scanning is not an option, a phone call or email stating the use report(s) will be late, the date they were mailed, and estimated arrival date will be accepted. If you leave a voicemail, follow up with email to DMMP@dnr.wa.gov. Also, you can press "0" to the front desk for assistance.

DNR PERMIT NO.: 20 520039

CORPS OF ENGINEERS

PERMIT NUMBER and Project Manager or Permit signature-only required on first report of each day:

N/A - No USACE Permit for this Project

DREDGING SITE (Lat/Long): 47 16 22.29 / 122 24 25.65

DISPOSAL SITE: Commencement Bay non-dispersive

DATE/TIME OF DISPOSAL: 8-31-2015 1433-1444

NAME OF TUG/TUG CAPTAIN: E FURY / Doug Patterson

COMPANY/PHONE NUMBER: Orion Marine Contractors / 253-552-1140

NAME OF BARGE/TYPE: Orion 2001 / Hopper

VOLUME OF BARGE: 1,750

BARGE LOAD NO.: 6

FATHOMETER READING: 429

FOR VTS SITES,

AUTHORIZATION OBTAINED

FROM COAST GUARD: (First and Last name), initials after VTS officer's name has been written in full once.

Once shift change to a new officer, then full name, followed by initials until shift change occurs again: M.B.

AS BARGE STARTS TO OPEN (Also recorded for barge orientation schematic due no later with monthly report)

FOR DISPOSAL: (Required) 47 16 2078 / 122 27 9214

TIME 1433 LATITUDE LONGITUDE

AS BARGE COMPLETES (Same as above, will be recorded for completion of barge orientation schematic)

CLOSING AFTER DISPOSAL: (Required)

TIME 1444 LATITUDE 47 18 2300 LONGITUDE 122 27 8990

ESTIMATED DISPOSAL QUANTITY

1296 YDS

(how calculated required on monthly report)

DESCRIBE PERCENTAGE FLOATABLE MATERIAL

REMOVED/DISPOSITION or other observations:

NAME/TITLE (Tug Captain) OF PERSON FILING

OUT REPORT/CONTACT NO.: CAPT Doug Patterson

SIGNATURE:

[Signature]



DISPOSAL SITE USE REPORT

INSTRUCTIONS TO TUG CAPTAINS: This disposal site use report **MUST** be completed (in its entirety) at the time of each disposal for both VTS and non-VTS monitored sites. Position coordinates read from the approved positioning aid **MUST** be recorded to the **NEAREST THOUSANDTHS** of a minute (e.g., 47° 56.556', 122° 16.786').

Note: The site use report must be submitted by the Monday after disposal. If the site use report will not reach Washington DNR by the following Monday, a scanned copy will be accepted. If scanning is not an option, a phone call or email stating the use report(s) will be late, the date they were mailed, and estimated arrival date will be accepted. If you leave a voicemail, follow up with email to DMMP@dnr.wa.gov. Also, you can press "0" to the front desk for assistance.

DNR PERMIT NO.: 20-520039

CORPS OF ENGINEERS

PERMIT NUMBER and Project Manager or Permit signature-only required on first report of each day:

N/A - No USACE Permit for this Project

DREDGING SITE (Lat/Long): 47 16 22.29 / 122 24 25.65

DISPOSAL SITE: Commencement Bay non-dispersive

DATE/TIME OF DISPOSAL: 9-1-2015

NAME OF TUG/TUG CAPTAIN: FORG / Doug Patterson

COMPANY/PHONE NUMBER: Orion Marine Contractors / 253-552-1140

NAME OF BARGE/TYPE: Orion 2001 / Hopper

VOLUME OF BARGE: 1,150

BARGE LOAD NO.: 3

FATHOMETER READING: 380

FOR VTS SITES,

AUTHORIZATION OBTAINED

FROM COAST GUARD: (First and Last name), initials after VTS officer's name has been written in full once.

Once shift change to a new officer, then full name, followed by initials until shift change occurs again: MC

AS BARGE STARTS TO OPEN (Also recorded for barge orientation schematic due no later with monthly report)
FOR DISPOSAL: (Required)

TIME 1642 LATITUDE 47 18 25.79 LONGITUDE 122 27 47.77

AS BARGE COMPLETES (Same as above, will be recorded for completion of barge orientation schematic)

CLOSING AFTER DISPOSAL: (Required)

TIME 1652 LATITUDE 47 18 23.66 LONGITUDE 122 27 44.44

ESTIMATED DISPOSAL

QUANTITY 9957 yds

(how calculated required on monthly report)

DESCRIBE PERCENTAGE FLOATABLE MATERIAL

REMOVED/DISPOSITION or other observations:

NAME/TITLE (Tug Captain) OF PERSON FILLING

OUT REPORT/CONTACT NO.:

CAPT. Doug Patterson

SIGNATURE: [Signature]



DISPOSAL SITE USE REPORT

INSTRUCTIONS TO TUG CAPTAINS: This disposal site use report **MUST** be completed (in its entirety) at the time of each disposal for both VTS and non-VTS monitored sites. Position coordinates read from the approved positioning aid **MUST** be recorded to the NEAREST THOUSANDTHS of a minute (e.g., 47°, 56.556', 122°, 16.786').

Note: The site use report must be submitted by the Monday after disposal. If the site use report will not reach Washington DNR by the following Monday, a scanned copy will be accepted. If scanning is not an option, a phone call or email stating the use report(s) will be late, the date they were mailed, and estimated arrival date will be accepted. If you leave a voicemail, follow up with email to DMMP@dnr.wa.gov. Also, you can press "0" to the front desk for assistance.

DNR PERMIT NO.: 20- 520039

CORPS OF ENGINEERS

PERMIT NUMBER and Project. Manager or Permit signature-only required on first report of each day:

N/A - No USACE Permit for this Project

DREDGING SITE (Lat/Long): 47 16 22.29 / 122 24 25.65

DISPOSAL SITE: Commencement Bay non-dispersive

DATE/TIME OF DISPOSAL: 04/14/15

NAME OF TUG/TUG CAPTAIN: Skagit / Cindy Larson

COMPANY/PHONE NUMBER: Orion Marine Contractors / 253-552-1140

NAME OF BARGE/TYPE: Orion 2001 / Hopper

VOLUME OF BARGE: 1,750

BARGE LOAD NO.: 8

FATHOMETER READING: 431 ft.

FOR VTS SITES,

AUTHORIZATION OBTAINED

FROM COAST GUARD: (First and Last name), initials after VTS officer's name has been written in full once. Once shift change to a new officer, then full name, followed by initials until shift change occurs again:

MAL

AS BARGE STARTS TO OPEN (Also recorded for barge orientation schematic due no later with monthly report)

FOR DISPOSAL: (Required)

16 23, 47° 18' 12.08" N, 122° 27' 55.32" W

TIME

LATITUDE

LONGITUDE

AS BARGE COMPLETES (Same as above, will be recorded for completion of barge orientation schematic)

CLOSING AFTER DISPOSAL: (Required)

16 32, 47° 18' 12.44" N, 122° 27' 55.99" W

TIME

LATITUDE

LONGITUDE

ESTIMATED DISPOSAL

QUANTITY

868 yds

(how calculated required on monthly report)

DESCRIBE PERCENTAGE FLOATABLE MATERIAL

REMOVED/DISPOSITION or other observations:

0%

NAME/TITLE (Tug Captain) OF PERSON FILLING

OUT REPORT/CONTACT NO:

Cindy Larson

360-302-1286

SIGNATURE:

Cindy Larson